a scientific open access quarterly

EBER

Entrepreneurial Business and Economics Review

eISSN 2353-8821

2024, Vol. 12, No. 2

KRAKOW UNIVERSITY OF ECONOMICS
Department of International Trade
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a scientific open access quarterly

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eISSN 2353-8821 2024, Vol. 12, No. 2

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Publisher

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Cover and DTP: Marek Sieja

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All articles are double-blinded peer-reviewed at least by two independent reviewers.
The detailed list of reviewers is published at our website once a year.

Original Version

The online journal is the primary and reference version.
Both printed and online versions of the journal are original and identical.

ISSN 2353-883X (printed version, in the years 2013-2019)
eISSN 2353-8821 (online version, since 2013)

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employing the Digital Object Identifier (DOI) System.
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EBER
Entrepreneurial Business and Economics Review
2024, Vol. 12, No. 2
10.15678/EBER.2024.120201

Ticket sales versus catering challenges for entrepreneurial hospitality workers at international events: A case study of the Melbourne International Comedy Festival

Paul Strickland, Vanessa Ratten

ABSTRACT

Objective: The objective of the article is to examine the catering challenges for hospitality workers versus ticket sales at the Melbourne International Comedy Festival (MICF) in terms of their entrepreneurial behaviour.

Research Design & Methods: This qualitative conceptual paper is based on interviewing hospitality workers at the MICF. Semi-structured interviews were used to survey venue managers and temporary hospitality workers whilst working at the MICF.

Findings: The findings showcase that although some service processes at international comedy festivals can improve, it is unlikely to change in any significant way due to the nature of how comedy festivals are operated and for the duration for the individual shows. It is not feasible to have too many full-time staff or event part-time staff when a temporary or casual work force can service ticket holders even though some people may have a negative experience. Therefore, the workers need to develop entrepreneurial skills in order to succeed in the competitive marketplace.

Implications & Recommendations: Investigating the challenges hospitality workers experience at the MICF when ticket sales are continually sold up until the performance is the first attempt at qualitative research in this field of study bridging the gap in event management, festival, and hospitality literature. It highlights the use of temporary hospitality workers as the main labour force of international comedy festivals and showcases some of the challenges hospitality workers experience. It acknowledges the need to think outside the box and to be innovative with work decisions.

Contribution & Value Added: This paper adds to the growing body of literature in challenges for the hospitality industry, temporary hospitality workers, international comedy events and last-minute ticket sales and offers practical implications to assist in future large-scale comedy and fringe festivals for the first time.

Article type:	research article
Keywords:	Melbourne International Comedy Festival; temporary hospitality workers; ticket sales; stock control; festivals; events
JEL codes:	033, F23, M15

Received: 13 September 2023 Revised: 2 November 2023 Accepted: 4 November 2023

Suggested citation:
Strickland, P., & Ratten, V. (2024). Ticket sales versus catering challenges for entrepreneurial hospitality workers at international events: A case study of the Melbourne International Comedy Festival. *Entrepreneurial Business and Economics Review,* 12(2), 7-17. https://doi.org/10.15678/EBER.2024.120201

INTRODUCTION

The arts play a significant role in Australia and around the globe and can be gauged by the economic, cultural, and social implications they bring to cities and regions including festivals. We usually gauge the success of festivals and events by ticket sales, food and beverage sales and audience attendance as it is more difficult to benchmark the cultural and social benefits (Allen, 2001). The Melbourne International Comedy Festival (MICF) is a leading international comedy event which was first launched in 1987 by Peter Cook and Barry Humphries to showcase international comedy talent (MICF, 2023a). Over

thirty-three MICF annual festivals have evolved to attract over 770 00 audience members hosted in March-April annually with an average ticket price of AUD 37.00 (MICF, 2023a). The MICF describes 'itself as an international festival, the Melbourne International Comedy Festival sells 91% of its tickets to local Melbourne residents, with only 4% of attendees visiting from other Australian states and, 1% from overseas' (Frew, 2009, p. 221). However, the official website states 'the annual Melbourne International Comedy Festival is the culmination of our ongoing activities and for three and a half weeks each year, makes Melbourne the centre of the comedy universe'. It now offers a roadshow scaled-down version which extends to India, Hong Kong, Singapore, and Malaysia.

In a study prepared for the Board of the MICF, Allen (2001, p. 12) confirmed 'there is no doubt that a range of important social and cultural benefits are delivered' at the MICF. These include social networks, people's confidence, employability and enhance creativity within the realm of arts and culture. The MICF also takes over unused spaces and venues to showcase comedy talents. This has led to temporary and 'pop-up' food and beverage service areas in locations which do not have permanent facilities or staff to cater for the audience needs in a relatively quick period-of-time (Dimitropoulos *et al*., 2019). This brings challenges for hospitality workers when ticket sales continue to sell until the opening of the comedy act leaving the temporary bars uncertain of how much food and beverage products to stock, how many temporary hospitality workers to employ and what these service standards will be. This topic is important as it can impact the experience of individual audience members and hospitality workers service standards reflecting on the MICF. The objective of this article is to explore this topic in detail, asking the overarching question: *What are the challenges hospitality workers experience at international comedy festivals when ticket sales are continually sold up until the performance?* By delving into the challengers of hospitality workers in such as environment, the practical implications will assist in future product and service offerings and add to the positive enhancement of hospitality workers and ticket holders attending a comedy festival which can be applied at other comedy festivals around the world. This is the first-time research at an international comedy festival has been explored from the hospitality workers' perspective offering original findings. The article is structured firstly by literature review offering definitions of festivals and comedy festivals, ticket sales and hospitality workers. Secondly, the methods sections highlight how the interviews were conducted. Thirdly, results and discussion elaborate on the findings, and lastly the conclusion offers practical implications, limitations, and future direction for research in hospitality and festival literature.

LITERATURE REVIEW

Festivals

Festivals around the global remain popular as festivals are 'an event, a social phenomenon, encountered in virtually all human cultures' (Falassi, 1987, p. 1). Festivals have been researched in anthropology, sociology, religion, and folklore for the last century however there is more to explore as festivals are created, developed, and improved. The word festival derives its meaning from the Latin term 'festum' which translates to 'public joy, merriment and revelry' (Falassi, 1987, p. 2). Originally festivals were based on religious and folklore customs which usually involved a celebration. This could be to support gods, seasons, crop harvests, and archaic folklore traditions among others. In the modern world, festivals are comprised of a selection of events forming a designated programme for visitors to select from (Taylor & Shanka, 2002). Modern festivals often innovate to showcase different product offerings or themed to specialise in sectors such as wine, the arts (fringes), culture, religion, and comedy (Davras & Özperçin, 2023).

Comedy Festivals

When applying this forementioned definitions, comedy festivals are a specific subset of festivals. Comedy festivals can be defined as 'is a celebration of comedy with many shows, venues, comedy performers (such as stand-up comics, sketch troupes, variety performers, etc.) and is held over a specific block of time' (Lobell, 2018). When applying the world 'fringe' to a comedy festival, it allows for a greater number of diverse, original, and artistic performances. The five largest comedy festivals in the world

in order of attendance numbers are: 1) Just for Laughs – Montreal; 2) Just for Laughs 42 – Toronto; 3) The Edinburgh Festival Fringe – Edinburgh; 4) Leicester Comedy Festival – Leicester; and 5) Melbourne International Comedy Festival – Melbourne (Lobell, 2018). However, this fluctuates depending on crowd numbers and performers as Smithwick's Cat Laughs Comedy Festival, Kilkenny, Ireland has made the top five and MICF ranked third in 2012 (The Guardian, 2007).

Although the positive economic and social implications of comedy festivals are well known, Allen (2001) acknowledges comedy festivals and the arts in general can have negative impacts to performers and audience members. This could be perceived value for money based on ticket price and the quality of the performance, the quality and quantity of food and beverage products available and overall service standards such as ticket sales efficiency, cleanliness of toilets, rubbish and drunken behaviour by attendees and performers. Comedians are judged on their original content but may have to contend with negativity relating to sexism, sexual preference, stereotypes, religion, and popularity (Bouchareb & Fadlaoui, 2022; Tomsett, 2023). However, Allen (2001) suggests comedy festivals offer a platform for individual and social growth which often can only be achieved through trial and error and continuous practice in front of live audiences and is generally positive.

Ticket Sales

The purpose of offering a definition of tickets sales is they are a major source of revenue to justify staging a comedy festival. Ticket sales are the 'sale of one or more tickets to an event, whether sold online, in person, or in any other manner' (Law Insider, 2023). By law, the entire price must include all taxes, shipping and handling fees however may exclude preferential seating, private conference gatherings and national tournament areas designated for performers. The MICF has four main platforms for purchasing tickets: 1) online via a third-party tickets sales platforms Ticketek and Ticket Master; 2) online directly through the MICF official website; 3) by phone; or 4) in person from outside the Melbourne Town Hall which will have a 'pop-up ticket sales booth' usually selling last-minute tickets (MICF, 2023b). To reduce the number of tickets being scalped (for an inflated price), the tickets sales booth has a re-selling scheme meaning they will resell the tickets on the current ticket holder's behalf at face value which is becoming common practice (Behr, 2021). This is currently the only way ticket sales can be somewhat regulated by the MICF.

Ticket sales are an indication of how many audience members will be attendance, predicted revenues and impact staffing levels which are generated based on this information and a prediction of additional ticket sales (Beaven & Laws, 2012). Due to the nature of comedy festivals, ticket sales are not always in advance therefore more difficult for hospitality workers to gauge staffing levels, amount of stock required for each show and potentially impacting service standards. This is compounded when ticket sales continue until the show begins and audience members still wanting food and beverages prior to entry and not miss the beginning of the performance. Ticket holders have a desire for quick service by hospitality workers which is a common occurrence in many performances such as the arts, opera, music events and comedy festivals (Maughan & Radošević, 2016).

Hospitality and Temporary Hospitality Workers

Hospitality workers are people who work in service industry including food and beverage establishments such as bars, restaurants, cafes, hotels, and casinos among a host of other offerings (Liu-Lastres *et al*., 2023). Temporary hospitality workers have always been employed in Australia for labour shortfalls in many industry sectors including hospitality and will continue to do so (Wright *et al*., 2021). However, there was a mass exodus of temporary workers from the hospitality sector due to the global pandemic. The flow on affect is many food and beverage establishments needed to find temporary workers to fill the hospitality worker gaps (Liu-Lastres *et al*., 2023). The most common way of finding legal temporary hospitality jobs is through employment agencies specialising in recruiting temporary hospitality workers (Knox, 2014). These temporary job seekers are often people between jobs, looking for flexible working hours, students, immigrant workers, backpackers, or people looking for additional income (Mooney *et al.,* 2016). Additionally, this has always been a very common recruitment solution

for festivals and events such as The Australian Open, Melbourne Cup and the MICF as labour is required for a short period of time, in different locations, for different tasks and demand driven.

The same applies to comedy festivals which provide food and beverages often in a limited capacity based on audience turnover between performances, flow of audience movements within the venue, and the number of permanent and 'pop-up' food and beverages stations at the venue. Therefore, it is appropriate to explore the role of the hospitality worker at comedy festivals and the tasks they must perform to give a positive experience for ticket holders and themselves. Studies have shown that positive experiences by both hospitality workers and festival attendees are more likely to return the following year whereas a negative experience will yield the opposite result (Davras & Özperçin, 2023; Koronios *et al.,* 2023). The gap in the literature is the challenges hospitality workers experience at Comedy Festivals when pre-purchased ticket sales are not the best indication of how much stock and hospitality worker labour is required impacting service standards for audience members for each comedy performance (Towers & Pratten, 2003). This creates the overarching research question: *What are the challenges hospitality workers experience at international comedy festivals when ticket sales are continually sold up until the performance?* This will give insight into the challenges they experience when pre-sold ticket sales may not be the best indication regarding the number of audience members who attend individual performances. It considers the practical implications to assist the service sector in improving the challenges of hospitality workers and the overall experience of ticket holders at international comedy festivals.

RESEARCH METHODOLOGY

A case study approach was used to interview hospitality workers at the MICF. Using exploratory and qualitative case studies is a common method in tourism research as a case study approach allows the investigator to explore individual opinions and delve deeper into contemporary real-life situations (Atithal *et al*., 2023; Morrison, 2023; Shrestha & L'Espoir Decosta, 2021). Case studies also allows for participant support, theoretical clarification, and replication of studies (Koščak, 2023). The interviews were conducted at four comedy stand-up events over two nights with ethics approval. Each comedy act lasted no longer than an hour conducted in Melbourne, Australia in April 2023. The venue locations were not designated comedy clubs but surplus rooms in the Melbourne Town Hall (2 performances) and two different rooms in local Melbourne establishments (2 performances). Convenience sampling was applied based on the researcher's ability to visit these sites (Yin & Campbell, 2014) after purchasing tickets at each performance. Participants were randomly approached to participate at the place of their employment based on their uniforms and hospitality tasks they were performing identified by the investigator. Participants were selected on their ability to conduct a 10-minute semi-structured interview which was audio recorded prior to or after each comedy event. No other criteria were applied and each temporary hospitality worker sort approval from a manager before agreeing to be part of the study. Participants could withdraw at any time. Consent was implied by responding to questions. Each participant was allocated an alias number for anonymity and given to each participant. For instance, Participant 1 was coded as P1 and the first to be interviewed and so forth. This created responses from P1-P8 in order of interview sequence. Furthermore, the investigator offered a university email address to have the ability to withdraw from the study at any time however no participants withdrew from the study.

RESULTS AND DISCUSSION

Employee Information

There was a gender balance of four male and four female participants, no-one identified as non-binary, and all were hospitality workers at the MICF. All were over 18 years of age with the medium age of twenty-two years old. Three participants managed the venue which included tasks of supervising staff, cashiering, and stock control whereas the other five participants were employed to sell food and beverages, clean the venue and re-stock products. Two participants were full-time employed directly by the venue (P1 and P6), P8 was permanent part-time for a bar and the other five (P2, P3, P4, P5 and P7)

were casually employed by the same recruitment agency specialising in temporary hospitality employment (refer to Table 1).

Table 1. Employer information: Who do you work for?

Pseudo Name	Response
P1	Directly by the venue
P2	Temporary Recruitment Agency
P3	Temporary Recruitment Agency
P4	Temporary Recruitment Agency
P5	Temporary Recruitment Agency
P6	Directly by the Town Hall
P7	Temporary Recruitment Agency
P8	Directly by the venue

Source: own study.

When asked the types of tasks each hospitality worker had to complete during their shifts, similar responses were given. The tasks were repetitive, and overwhelming included the selling of alcoholic beverages. P4 stated 'we do sell packets of chips and chocolates, but most people want a beer or wine…that is why we have these pre-packaged plastic wines or a can [beer, cider or spirits] to speed up the process'. All venues had a 'pop-up' or 'temporary bar' to cater for the audience members in a timely manner. On average, venues had 10 minutes to disperse audience members from a show, clean the venue of obvious rubbish, and seat other audience members for the next show. In that time period, food and beverage sales also take place giving a time challenge for hospitality workers to cater for all ticket holders needs prior to the show commencing. As one manager mentioned 'timing is everything… we have to be as quick as we can' (P6). What became apparent was all staff knew their exact role and the tasks they were to perform. The manager of the Town Hall summarised similar opinions of others:

> 'We have about ten staff here tonight and everyone has a specific job to do. There are six people serving and the others will be stocking the bars and clearing away glasses and rubbish…guests are always messy at these types of venues' (P6) and,
>
> 'We expect the staff to be trained and simply take over even if they are temporary workers…this is why we pay higher wages for their skills (P1).

This is important as these comments support findings by Knox (2014) and Liu-Lastres, Wen and Huang (2023) as temporary workers need to be previously trained and ready to offer their skills in a quick and timely manner with little intervention by managers. It also means each staff member can focus on their tasks and not be concerned what others are undertaking even though it is a team effort.

Stock Control

When asked: 'who orders the stock for the bars?', only one temporary agency worker did not know (P5) whereas the venue managers all stated to have ordered stock by other participants. Having managers order stock is common practice in the hospitality industry to reduce pilferage, especially when alcohol is involved (Mooney *et al.,* 2016). The question: 'who stocks the bar?' was also asked. The was an array of different responses from 'we all help' (P4), and 'we all have to help but then we have certain staff who will continually stock the fridges' (P3) and 'I don't stock the fridges as I serve at the bar. I think [insert name] is stocking the fridges tonight' (P8). This is more evidence that temporary hospitality workers are concerned with their own tasks and assume the bar refrigerators will be stocked if it is not specifically assigned to them.

To try and understand actual stock control procedures at the MICF using pop-up bars, the question posed was: 'how do you determine stock par levels for each show/the night?'. Three temporary hospitality workers did not know (P2, P3 and P5) whereas the others offered more substantial answers. P1 stated:

> 'The stock for the bars come from a central location in the delivery area. We just keep filling up the fridges as much as we need…. [insert name] orders all our supplies. We do have par levels, but I don't exactly how much they are….it would have to be 10% at least I would think'.

Similarly, P6 commented:

> 'I do all the ordering. I estimate on seating capacity which is 300 seats. Then I multiply it by how many shows for the evening and allow for 1 ½ drinks each. This is because most people will have at least one drink, others may have two which accounts for the other half. Then I add another 10% so we don't run out. So tonight, we have 4 shows all sold…let me write this down. Four shows times 300 seats times one and a half drinks equals 1800 drinks. Then I try and break it down from previous sales to see what I should be ordering like how many rose bottles based on seven drinks per bottle. Then add 10%. It is a little tricky, but it works'.

Additionally, P4 stated how it can affect customers:

> 'We have to make sure we have enough stock for the night or at least another option…as you can see, you have three types of white wine, three reds, sparkling and rose…if we run out, they [tickets holders] will have to choose something else'.

Each venue at the MICF has their own method of ordering stock based on the venue design and if a permanent or temporary venue. This is in line with Frew (2009) who found that individual preference behaviour influenced the success of a festival. What is significant about these comments are hospitality workers are striving to maintain stock levels to service audience members based on either refrigerator capacity or historical food and beverage sales. However, P4 mentioned if stock 'runs out', ticket holders have to select something else. Although not the best attitude for quality service, it is a realistic approach that occurs in all sectors, not just MICF. For instance, a venue manager stated: 'we can't sell something we do not have' (P6) and 'people just want a drink quickly, so they'll order anything available' (P2). It was mentioned that the transactions are quick therefore no real negativity would be generated from not having the customers' first choice of beverage (P3 and P4). This corresponds to research by Falassi (1987) who found that festival organisers need to continually respond to new contexts.

The next questions were: 'have you ever run out of stock?' and 'can you remember what it was?' Four participants either did not know or could not recall. However, the other four participants responses were:

> 'We occasionally run out of individual items. Last week we ran out of Allen's Snakes but that is not a big seller. Some wines run out but it's rare' (P1),
>
> 'We ran out of apple cider at the start of the festival because we had a promotion on…it was a big hit…nothing else though' (P3),
>
> 'Of course, we run out of stock every now and then. Everything has a shelf life so we to make sure we turn the stock over as quickly as possible. That means, sometimes stock runs out, but it is of benefit for the next customers as they won't have anything old or sitting there for ages' (P6), and
>
> 'I cannot believe you came on a night when we had to shut the bar because we basically ran out of everything. There was a miscommunication with the stores and the Food and Beverage Manager left with the key. We had to call him back and reopen the central stores. We were able to restock when you were watching the show [laughing]. It's one of things, it had to happen when you came to interview me' (P7).

It is important to acknowledge that stock control is essential at festivals such as the MICF in order to adequality service the paying audience. These four participants understand that products occasionally run out of stock, nonetheless it can be managed by offering substitute products. Furthermore, although amused by laughing, P7 identified a communication issue which resulted in the closure of the bar for an hour. This meant a loss of sales, disgruntled ticket holders and embarrassed staff by not having a second key to the storeroom (Towers & Pratten, 2003). This will be investigated for future shows.

Ticket Sales

This research included questions regarding ticket sales. It was to establish if the hospitality workers are aware of how busy their shift/night will be. Ticket sales have a flow on affect for stock control, abilities of hospitality workers and the quality of service for the ticket holders. Table 2 indicates a brief response from each participant answering the question: 'do you know how the tickets are sold to the comedy show tonight?'

Table 2. Knowledge of ticket sales: Do you know how the tickets are sold to the comedy show tonight?

Pseudo Name	Response
P1	I think it is a sell-out (capacity is 850 seats)
P2	I have no idea
P3	Nope, wouldn't know
P4	No, I only count the number of drinks and food sold
P5	We were told it was full (capacity is 450 seats)
P6	At 6:45pm we had sold 272 tickets (capacity is 300 seats – show started at 7pm)
P7	We expecting to be full as it's [insert name] tonight (capacity is 700 seats)
P8	We had 17 spare seats when I checked during the show (capacity is 80 seats)

Source: own study.

This is significant as it indicates the communication between managers and temporary employees or lack of. It also showcases the differences between venue managers wanting to know ticket sales and temporary workers who show less interest, or it does not impact their employment duties. Furthermore, Table 3 highlights the question: 'how many shows are at this venue tonight?' These responses indicate comedy performances at the MICF are not consistent in number at each venue and the briefing of staff of how many shows is not always occurring. Venue managers were briefed on ticket sales however temporary hospitality workers were not always briefed or did not pay attention if they were. It was suggested that 'we sign on for a number of hours, so it doesn't really matter how many shows are on' (P5). Table 3 shows a summary of responses.

Table 3. Knowledge of number of shows in an evening: How many shows are at this venue tonight?

Pseudo Name	Response
P1	We have three shows tonight and can seat about 850 people
P2	3 shows
P3	I think it is two
P4	Only 2 shows
P5	Being Friday, we have 4 shows
P6	This is a popular venue and go from 6pm until 11pm so I think that is four shows
P7	We have 4 shows tonight
P8	Pretty sure it is only 2 but one show is 90 mins, not 60

Source: own study.

This is compelling as it indicates the different tasks hospitality workers are required to perform and hints to their motivations of hospitality employment. From the responses, venue managers are full time and have an invested interest in tickets sales, stock control and hospitality labour costs which are all linked to the venue's revenues. Conversely, temporary hospitality workers are willing to perform their tasks in a professional manner but are more motivated by their wages, not necessarily the revenues of the venue. The is confirmed with statements such as 'I get paid well' (P2), 'it's helping me pay for university' (P3) and 'I love everything about it…it's challenging and financially rewarding and never a dull moment' (P7).

There were negative responses highlighted by working in hospitality which were 'the long hours' (P1), 'missing out on social occasions' (P3), 'lack of public transport when the shift is finished' (P5) and 'drunk people' (P8). Regardless of these, working in hospitality at the MICF, participant motivations

were currently working full time in hospitality, and 'this is just part of the role', (P3) paying for university, wanting to become a hotel manager, earning money for travel and the others were unsure.

Changes to Service Delivery at the MICF

Finally, the question: 'If there was something you would change about service delivery at the MICF, what would it be?' was asked. Responses varied from: 'Everything is plastic but easy to clean up, but I prefer to serve wine and champagne in proper glasses' (P1); 'MICF is really well known for comedy. I don't think anyone really cares about service standards as long as they get a beer or wine quickly (P4), and 'I don't think there is much else we can do different' (P2). However, there were some suggestions:

> 'This is my first MICF so I know this must be the best way of doing things, but I would try and change the queuing systems. There is no clear line and who to serve next. Customers have to be polite and work out who is next for themselves' (P5), and
>
> '[Laughing], now that you didn't get a drink, I guess we need to work out where the spare key [to the storeroom] is? In terms of service, I think we have the balance right…. I was told that over 750 000 people attend the MICF every year, so it is hard to give the best possible service to everyone' (P7).

It is important to continuous evaluate service standards in the hospitality sector. Although these suggestions are ideal from a quality and improved service standard point-of-view, due to mass audience patronage and quick performance turnovers, hospitality workers understand that this is not always possible. Furthermore, it is widely acknowledged that these service standards are common at comedy festivals globally (Behr, 2021).

CONCLUSIONS

This paper explored the challenges hospitality workers experience at an international comedy festival when ticket sales are continually sold up until the performance. Service standards and tasks which involved temporary hospitality workers using MICF as a qualitative case study was applied. The article explored with the overarching research question: *What are the challenges hospitality workers experience at international comedy festivals when ticket sales are continually sold up until the performance?* Firstly, employees were either full time venue managers or temporary hospitality workers employed through a hospitality recruitment agency. Staff are expected to be skilled in food and beverage tasks such as cashiering, selling food and beverage products, cleaning, and re-stocking products (Behr, 2021). The main task for many was selling alcoholic beverages. Secondly, stock control of food and beverage products was essential to the success of selling products in a short period of time. This included the use of 'temporary' or 'pop-up' bars to maximum sales in a timely manner and striving to meet ticket holders' expectations. On average, it was ten minutes between shows to clear the venue of audience members, clean up, serve incoming ticket holders with food and beverages, and get them seated ready for the next comedy performance. Not having access to stock and/or running out of products may result in a reduction of sales, although most ticket holders would select another alcoholic beverage if unavailable. Thirdly, it was important for venue managers to know ticket sales to forecast staffing levels, par-stock levels and tasks required to be performed by hospitality workers. This included knowing how many shows per night which was not important to temporary hospitality workers. They were more concerned with their remuneration and how many hours they were working. Temporary hospitality workers may not have been told how many tickets were sold, or how many performances, and if they were, may not have paid attention as it was not of concern to complete their shift.

Fourthly, some hospitality workers would like to see better service standards such as reducing plastic and using reusable glassware, however, understand due to the nature of the MICF, audience movements, time restraints and use of pop-up bars, it is not practical. This type of service happens at many comedy festivals and the expectations are most likely lower from an audience viewpoint. Investigating the challenges hospitality workers experience at the MICF when ticket sales are continually sold up until the performance is the first attempt at qualitative research in this field of study

bridging the gap in event management, festival, and hospitality literature. It highlights the use of temporary hospitality workers as the main labour force at international comedy festivals and showcases the challenges hospitality workers experience being employed in this sector. The findings showcase that although some service processes at international comedy festivals can improve, it is unlikely to change in any significant way due to the nature of how comedy festivals are operated and for the duration for the individual shows and overall festival. It is not feasible to have too many full-time staff or event part-time staff when a temporary or casual work force can service ticket holders even though some people may have a negative experience. International comedy festivals would not survive if more food and beverage options and greater service standards were to be offered. The key to the success of comedy festivals is crowd control and the flow of the audiences between shows. Venue stakeholders should brief hospitality workers prior to performance as many workers did not know any additional information to assist in their expected tasks, they were just given guidance of their specific role for the shift however, it appears to work.

The limitations of this study are that one comedy festival, the MICF was the case study for the data collection and analysis. Therefore, it would be useful to compare and contrast the MICF with other international comedy festivals to see if the hospitality workers are entrepreneurial in the same way. Culture may play a role in how hospitality workers adapt to changing circumstances and how they build business ventures. In addition, as the festival type was comedy other types of festivals such as art and music could also be investigated to see if the same type of responses were received. This means obtaining additional longitudinal data to see the effects over time based on context.

Future directions include to include different stakeholder perspectives from the employee, employer, festival organizer and government perspective. Each person may have a different approach to how they can or cannot be entrepreneurial at a comedy festival. It would be interesting to compare private and public forms of events in terms of prices and location to understand entrepreneurial behaviour. As not much has been done on comedy festivals in the entrepreneurship literature this research will partly fill a research gap about entrepreneurship and festivals thereby paving the way for new research to focus on this interesting topic.

REFERENCES

Allen, L. (2001). The Social and Cultural Impacts of the Melbourne International Comedy Festival. Retrieved from http://living-proof.com.au/wp-content/uploads/2015/11/AllenL_MelbIntrntnlComedyFestival2001.pdf on October 20, 2023.

Aithal, R., Anil, R.K., & Angmo, D. (2023). Rural tourism in India: case studies of resilience during crisis. *Worldwide Hospitality and Tourism Themes, 15*(1), 63-73. https://doi.org/10.1108/WHATT-08-2022-0104

Behr, A. (2021). State 15 of play. Tensions and interventions in live music policy. In C. Anderton and S. Pisil (Eds.), *Researching Live Music: Gigs, Tours, Concerts and Festivals* (pp. 212-224). Routledge.

Beaven, Z., & Laws, C. (2012). Principles and applications in ticketing and reservations management. In I. Yeoman, M. Robertson, J. Ali-Knight, S. Drummond, & U. McMahon-Beattie (Eds.), *Festival and Events Management* (pp. 183-201). Routledge.

Bouchareb, F., & Fadlaoui, R. (2022). Understanding Racial Issues through the Lens of Muslim American Stand-up Comedy. Retrieved from https://dspace.univ-guelma.dz/xmlui/handle/123456789/13335 on October 2, 2023.

Davras, Ö., & Özperçin, İ. (2023). The relationships of motivation, service quality, and behavioural intentions for gastronomy festival: the mediating role of destination image. *Journal of Policy Research in Tourism, Leisure and Events, 15*(4), 451-464. https://doi.org/10.1080/19407963.2021.1968881

Dimitropoulos, P.E., Vrondou, O., & Koronios, K. (2019). Earnings predictability of the Greek hospitality industry during the crisis. In *Smart Tourism as a Driver for Culture and Sustainability: Fifth International Conference IACuDiT, Athens 2018* (pp. 647-658). Springer International Publishing.

Falassi, A. (1987). Festival: Definition and morphology. *Time out of Time: Essays on the Festival*, 1, University of New Mexico Press, Albuquerque

Frew, E. (2009). Festival image creation: The role of local and interstate newspapers. *Tourism Analysis, 14*(2), 221-230. https://doi.org/10.3727/108354209789116592

Knox, A. (2014). Human resource management (HRM) in temporary work agencies: Evidence from the hospitality industry. *The Economic and Labour Relations Review, 25*(1), 81-98. https://doi.org/10.1177/1035304613517454

Koronios, K., Kriemadis, A., Dimitropoulos, P., Douvis, I., Papadopoulos, A., & Manousaridou, G. (2019). Emotional intelligence of employees in the hospitality sector: Exploring its effects on job satisfaction and performance. In *Smart Tourism as a Driver for Culture and Sustainability: Fifth International Conference IACuDiT, Athens 2018* (pp. 515-525). Springer International Publishing.

Koščak, M. (2023). Ethical and responsible tourism: managing sustainability in local tourism destinations. In Ethical and Responsible Tourism: Managing Sustainability. In Koščak, M., & O'Rourke, T. (Eds.), *Local Tourism Destinations* (pp-201-217). Taylor & Francis. https://doi.org/10.4324/9781003358688-7

Law Insider. (2023, September 27). *Ticket Sales Definition*. Retrieved from https://www.lawinsider.com/dictionary/ticket-sales on October 20, 2023.

Lobell, K.O. (2018, August 16). A Comprehensive Guide to Comedy Festivals in the U.S. and Around the Globe. Vulture: Devouring Culture. Vox Media Network. Retrieved from https://www.vulture.com/2018/08/a-guide-to-comedy-festivals-in-the-u-s-and-around-the-globe.html on October 2, 2023.

Liu-Lastres, B., Huang, W.J., & Bao, H. (2023). Exploring hospitality workers' career choices in the wake of COVID-19: Insights from a phenomenological inquiry. *International Journal of Hospitality Management*, 111, 103485. https://doi.org/10.1016/j.ijhm.2023.103485

Liu-Lastres, B., Wen, H., & Huang, W.J. (2023). A reflection on the Great Resignation in the hospitality and tourism industry, *International Journal of Contemporary Hospitality Management, 35*(1), 235-249. https://doi.org/10.1108/IJCHM-05-2022-0551MICF. (2023a, September 27). Background. Retrieved from https://www.comedyfestival.com.au/about-us/background on May 2, 2023.

MICF. (2023a, September 27). About-US. Retrieved from https://www.comedyfestival.com.au/about-us on October 4, 2023.

MICF. (2023b, September 27). How to Book. Retrieved from https://www.comedyfestival.com.au/2024 on October 2, 2023.

Maughan, C., & Radošević, L. (2016). *Are You Having a Laugh, Comedy and Festivals in the 21st Century.* Goodfellow Publishers. https://doi.org/10.23912/978-1-910158-55-5-3005

Mooney, S.K., Harris, C., & Ryan, I. (2016). Long hospitality careers–a contradiction in terms?. *International Journal of Contemporary Hospitality Management, 28*(11), 2589-2608. https://doi.org/10.1108/IJCHM-04-2015-0206

Morrison, A.M. (2023). *Marketing and managing tourism destinations* (3rd ed.). Routledge.

Strestha, R.K., & L'Espoir Decosta, P. (2023). Developing dynamic capabilities for community collaboration and tourism product innovation in response to crisis: Nepal and COVID-19, *Journal of Sustainable Tourism, 31*(1), 168-186, https://doi.org/10.1080/09669582.2021.2023164

Taylor, R., & Shanka, T. (2002). Attributes for staging successful wine festivals. *Event Management, 7*(3), 165-175. https://doi.org/10.3727/152599502108751569

The Guardian. (2007, March 16). Five top comedy festivals around the world. Retrieved from https://www.theguardian.com/travel/2007/mar/16/scotland.canada.australia on May 1, 2023.

Tomsett, E. (2023). *Stand-up Comedy and Contemporary Feminisms: Sexism, Stereotypes and Structural Inequalities*. Bloomsbury Publishing.

Towers, N.S., & Pratten, J. (2003). Stock control and supplier relationships at the local pub in a market town: A case study investigation into effective demand management. *British Food Journal, 105*(9), 591-601. https://doi.org/10.1108/00070700310497336

Wright, C.F., Knox, A., & Constantin, A. (2021). Using or abusing? Scrutinising employer demand for temporary sponsored skilled migrants in the Australian hospitality industry. *Economic and Industrial Democracy, 42*(4), 937-959. https://doi.org/10.1177/0143831X18823693

Yin, R.K., & Campbell, Donald T. (2014). *Case study research and applications: design and methods* (6th ed.). SAGE.

Ministry of Education and Science
Republic of Poland

The journal is co-financed in the years 2022-2024 by the Ministry of Education and Science of the Republic of Poland in the framework of the ministerial programme "Development of Scientific Journals" (RCN) on the basis of contract no. RCN/SP/0583/2021/1 concluded on 13 October 2022 and being in force until 13 October 2024.

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Acknowledgements and Financial Disclosure

The authors would like to thank the anonymous referees for their useful comments, which allowed to increase the value of this article.

Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Published by Krakow University of Economics – Krakow, Poland

Entrepreneurial Business and Economics Review

2024, Vol. 12, No. 2

10.15678/EBER.2024.120202

Women entrepreneurial orientation: A systematic literature review

Leul Girma Haylemariam, Stephen Oduro, Giada Mainolfi, Alessandro De Nisco

ABSTRACT

Objective: The objective of the article is to investigate the status and evolution of women's entrepreneurial orientation (WEO) research from 1990 to 2021 through a systematic literature review.

Research Design & Methods: We examined 204 peer-reviewed scholarly articles to identify and analyse study themes, publication trends, journal outlets, research methods, country, and regional distributions, and the theoretical landscape of WEO research through a mixed methodology of descriptive and content analyses.

Findings: Our analysis showed the following key findings: (1) publication trends show a constant growth of interest in WEO research, particularly in the last decade (2011-2021), with most of the articles published in high-ranked journals outlets; (2) quantitative research dominates the field above qualitative studies and conceptual models; (3) study themes are multidimensional, embodying a wide range of topics (4) research is generally US-centric regarding the individual countries, and in terms of the regional distribution, studies are Australasia and Europe centric; and, finally (5) studies mainly employ the theory of entrepreneurship and theory of planned behaviour in the theory-driven studies.

Implications & Recommendations: The results imply that WEO research is growing in interest in both theory and practice, thereby demanding the attention of women entrepreneurship researchers.

Contribution & Value Added: This study contributes to the literature by reviewing and discussing the body of WEO literature. It provides a comprehensive understanding of the phenomenon. The findings of this study can benefit researchers in understanding the status and evolution of WEO. It can also assist policymakers and governments in developing suitable policies and initiatives.

Article type:	systematic literature review
Keywords:	entrepreneurial orientation; women entrepreneurs; systematic review; innovativeness; risk-taking; proactiveness
JEL codes:	L26, J24, G41

Received: 18 February 2023 Revised: 22 November 2023 Accepted: 12 December 2023

Suggested citation:
Haylemariam, J.G., Oduro, S., Mainolfi, G., & De Nisco, A. (2024). Women entrepreneurial orientation: A systematic literature review. *Entrepreneurial Business and Economics Review,* 12(2), 19-42. https://doi.org/10.15678/EBER.2024.120202

INTRODUCTION

Women are among the most rapidly growing groups of entrepreneurs globally, contributing considerably to economic growth, employment, innovation, and the well-being of societies (Kelley *et al.,* 2017). Women's entrepreneurship is a separate subject of study within entrepreneurship research (Popescu, 2012). Women are taking centre stage in a growing field of entrepreneurial orientation (EO) research (Goktan & Gupta, 2015; Dawson & Henley, 2012; Ndubisi & Agarwal, 2014; Kundu & Rani, 2004). Many studies have undertaken customized research, the findings of which have highlighted the significance of researching women's entrepreneurial orientation (WEO) (Jennings & Brush, 2013; Welter *et al.*, 2014; Gartner *et al.,* 2010; Henry *et al.,* 2015; Holmquist & Carter, 2009).

Entrepreneurial orientation is a crucial concept in entrepreneurship (Jiang *et al.,* 2018). Entrepreneurial orientation is a strategic stance that specifies processes and activities that provide a framework

for tactical decisions and behaviours in enterprises (Mehrabi *et al.,* 2019; Jiang *et al.,* 2018). Scholars often define EO as a multidimensional framework implemented at the company or entrepreneur level that demonstrates the entrepreneurial abilities of the entrepreneur or firm along five dimensions: innovativeness, proactivity, risk-taking, autonomy, and competitive aggressiveness (Wiklund & Shepherd, 2003; Taylor, 2013; Mohutsiwa, 2012; Mwaura *et al*., 2015; Basile, 2012).

How EO applies to women entrepreneurs has been researched over the years. However, nothing specifically focused on women's entrepreneurial orientation (WEO) literature has yet not been done. Even the previous SLRs focusing on EO (*e.g.* White *et al.,* 2021; Solikahan & Mohammad, 2018; Montiel-Campos, 2018; Wales, 2016; Cortes *et al.,* 2021) are subject-specific and mixed, without distinction between men and women entrepreneurs. For instance, White, Chaudhary, and Gupta (2021) concentrated on the issues related to EO measurement. At the same time, Solikahan and Mohammad (2018) explained the development of EO and its measurement. Montiel-Campos (2018) focused on the relationship between EO and market orientation, and Wales (2016) analysed and synthesized critical research on EO.

These studies have contributed tremendously to highlighting different aspects of EO. However, none of them systematically investigated WEO. Moreover, research on WEO is fragmented across journals, disciplines, cultures, and contexts, making it difficult to view the WEO research landscape comprehensively. Relatedly, we lack an organizing, synthesizing framework that maps and calibrates the status and evolution of WEO research over the years to highlight what we know, what we do not know, and what we should know about the phenomenon.

To fill this gap, the present research focuses on WEO by seeking to answer the following research questions:

RQ1: What is the status and evolution of WEO research in the entrepreneurship management research streams regarding journal outlets, themes, theories, study methods, and geographical and cultural distribution?

RQ2: How does the academic literature examine WEO throughout the years and the significant tendencies of WEO research?

RQ3: How might the prevailing literature's judgments help craft a conceptual model of WEO study and propose research directions for further study?

Undertaking an integrated and comprehensive evaluation of how EO is linked with women's entrepreneurship over the years, the study contributes the following inputs to women's entrepreneurship research and practice:

Firstly, this research provides original insight into the current conversation of WEO by undertaking a comprehensive SLR of 204 peer-reviewed publications in business and management journals from 1990 to 2021. Secondly, our assessment is the first to implement a detailed and complete approach in this research stream by categorizing and classifying the scattered and fragmented articles published in the most relevant academic business and management databases (Emerald Insight, ProQuest, ScienceDirect, Business Source, Complete Web of Science, EBSCO, and JSTOR) to offer a synopsis of the field for theory and pragmatic developments. Thirdly, our research brings valuable insights to support researchers and practitioners in understanding the principal issues studied in WEO and indicating the evolving results for further EO research. Therefore, this investigation would help disclose significant knowledge gaps concerning the themes, national and regional background focus, conceptual orientation, and methodological illustrations of the phenomenon.

The rest of the study is organized as follows. The next section will delineate the literature review. We will follow it by the material and methods section, in which we will present the SLR process and then the results section will follow with the study's findings. Next, we will present the discussion and conclusion section, followed by the implications of the study, both theoretical and practical. The last section will discuss the research limitations of the study and future research suggestions.

MATERIAL AND METHODS

Approach and Nature

A systematic literature review (SLR) is crucial as it aims to comprehensively locate, evaluate, and synthesize all relevant research on a particular subject to thoroughly understand the findings and their implications. Furthermore, the SLR mitigates the potential to minimize the risk of bias caused by human error (Vuori & Väisänen, 2009; Cook *et al.,* 1997; Petticrew & Roberts, 2008). Moreover, Tranfield *et al.* (2003) highlighted that a comprehensive SLR is a crucial research goal for academic and practitioner communities across several disciplines. This endeavour gathers the most reliable and relevant information to guide policy-making and practical applications. The SLR methodology has seen advancements over the last two decades and has become an integral component of evidence-based research (Deng & Smyth, 2013; Crossan & Apaydin, 2010). The proposed framework provides a systematic and observable method for researchers to evaluate and identify different methods of investigation suitable for a particular subject matter. A systematic research review is an efficient approach for identifying, evaluating, and synthesizing pertinent research about a specific topic to understand the studies and their respective outcomes.

The current research used the SLR approach by following the systematic review protocols recommended by Tranfield *et al.* (2003), Sampaio and Mancini (2007), and Petticrew and Roberts (2008). However, we made some alterations and adjustments to adapt to it social science research. Figure 1 shows the research protocol adopted and adapted. The right side of the structure shows the exclusion criteria and articles that did not match the study target of the evaluation. In contrast, the left side of the structure exhibits the inclusion criteria and articles included in the systematic review.

Based on a standard systematic review protocol, the first step of the analysis encompassed choosing search terms. The multidimensional nature of the WEO concept has caused scholars to use different terminologies to explain the same subject, like 'women entrepreneurial orientation' and 'women entrepreneurial orientation' (Kundu & Rani, 2016; Mahmood & Hanafi, 2013). This way, we searched for articles published in the following international databases: Emerald Insight, ProQuest, ScienceDirect, Business Source, Complete Web of Science (WoS), EBSCO, and JSTOR. The choice of the database in which we collected the data was guided by the decision to maximize coverage, to be inclusive, and to see to it that the review included a comprehensive, relevant collection of articles. We selected these databases, because they are an extensive database of scholarly articles, are widely recognized, and are frequently used for quantitative and qualitative analyses (Donthu *et al.,* 2020). They also contain much citation information and are widely accessed databases for business management and entrepreneurship studies. Thus, we used the following keywords in the subject terms, abstract, and title: 'women or women entrepreneurial orientation;' 'women or women entrepreneurs' innovativeness;' 'women or women entrepreneurs risk-taking;' 'women or women entrepreneurs proactiveness;' 'women or women entrepreneurs' autonomy;' 'women or women entrepreneurs' competitive aggressiveness;' 'women-owned firms or enterprise;' 'women entrepreneurial intentions.'

Study Selection, Inclusion, and Exclusion Criterion

The search period was from January 1, 1990, to December 30, 2021, which was within the specified period of the project. Moreover, the timeframe was chosen, because it is when WEO research has witnessed rapid expansion in the mainstream literature. Therefore, this time frame was considered appropriately aligned with our research objective of investigating the development of WEO research from its initial phase to the current period. The search inquiry comprised only English language, full-text, online articles in business-management-related areas, and peer-reviewed articles. Our search process started on December 27, 2021, and 2683 articles were discovered in the early search in the topic field. This study advanced the search field by investigating the subject term, domains for the timeframe selected, title, and abstract. This modification produced a total of 297 articles. The co-authors autonomously arranged and examined the articles based on the abstracts to maintain con-

sistency. Abstracts were evaluated for significance and included only those that met the inclusion criteria (*i.e.* peer-reviewed articles focusing on women's entrepreneurial orientation, empirically, and theoretically). We examined the full texts when the abstract did not depict the article's content. After the primary screening, 53 articles were excluded since their focus or themes (*e.g.* social capital, women, women empowerment, etc.) were unrelated to the WEO theme.

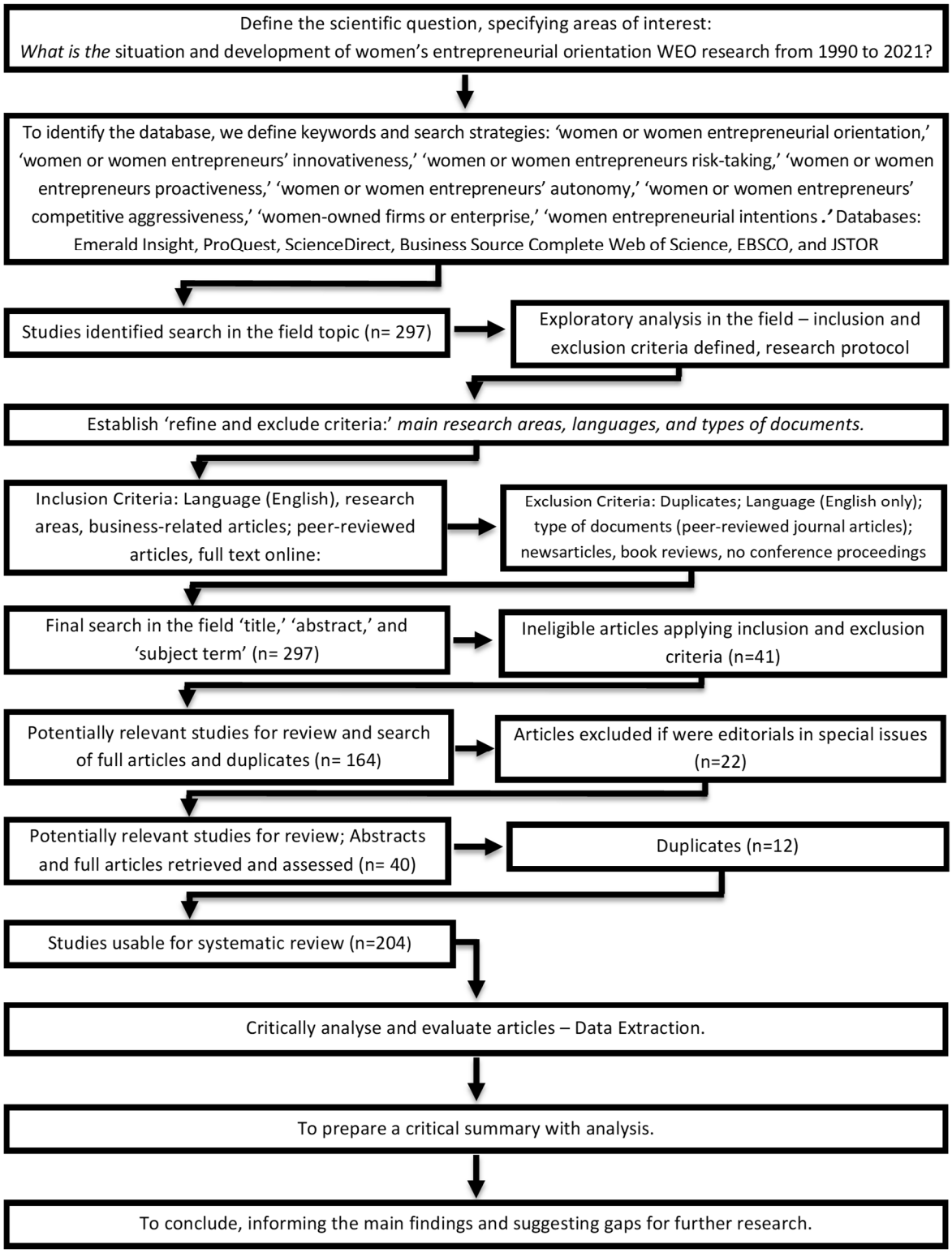

Figure 1. Systematic review: Design of the research protocol

Source: own elaboration of Petticrew and Roberts (2006), Tranfield et al. (2003), and Sampaio & Mancini (2007).

Furthermore, we omitted 22 articles as they were not peer-reviewed articles. Finally, we deleted duplicates from the database. After the final screening, a final list of 204 full articles aligned with the objective of the study, thus forming the basis of the analysis. Our grouping scheme was based on three critical strands: regional focus, methodology, and study theme. Firstly, the categorization of the region was based on a modified version of Guthrie and Murthy's (2009) original categorization of geographical areas of research: Australasia (Australia, New Zealand, parts of Asia, Malaysia, Thailand, Taiwan, India, Japan China, Singapore), Europe (Italy, Sweden, Germany, France, South America, Denmark,) North America (USA, Canada, and Mexico), UK (Wales, Ireland England, Scotland) Africa and others (UAE). Thus, this study sorted the articles into seven (7) main regional blocs: Australasia, Europe, North America, the UK, Africa, South America, and others. The study has labelled the articles as global, not limited to one geographical region.

Secondly, the study sorted the articles based on the methodological outline of the articles established in the study conducted by Caldas *et al.* (2002), who categorized research methods as (1) theoretical/conceptual, (2) empirical, or (3) theoretical and empirical. If an article is classified as (1) theoretical/conceptual – that is, articles concentrating on concepts or theories without displaying data, we grouped the articles based on discussions from Weick (1995) and Whetten (1989): (a) theoretical essay that builds or proposes a theory, (b) theoretical essay of current theory systemization, (c) theoretical essay on existing theory and (d) theoretical essay that builds or proposes a concept or construct. For (2) empirical studies and (3) theoretical and empirical articles – which present data analysis or conceptual and data analysis (Lewis, 2015) – a method was used to evaluate the study method and classify it as either (a) quantitative, qualitative, or quality-quantitative studies. Furthermore, this study organized the research design in the articles into a single case study or multiple case studies, semi-interviews, and surveys/questionnaires.

Lastly, the study categorized themes examined in the articles using the co-occurrence or frequency of keywords/themes in the title of articles based on simple cluster analysis, a method like previous reviews (*e.g.* Oduro *et al.,* 2021; Furrer *et al*., 2008; Lu *et al.,* 2016). This way, we classified articles as themes/independent variables, outcomes, and drivers/determinants. Regarding the themes or independent variables, we used the EO model to group the articles into innovativeness, proactiveness, risk-taking, autonomy, and competitive aggressiveness. Regarding the outcomes, we grouped articles into eight (8) main blocks: access to venture, attitude/behaviour, business creation/new products or market development, business/venture success, entrepreneurial intentions, family development, performance (financial or non-financial), and others. Finally, concerning the drivers/determinants, we grouped articles into seven (7) critical strands: cultural orientations, family orientations, funding support, leadership orientations, personal factors/orientations, religious orientations, and wealth creation.

This study employed content and descriptive analyses to analyse the collected data research. Content analysis has been used in management studies for the objective, systematic, and quantifiable examination of textual information (Neuendorf *et al.,* 2010; Williams & Plouffe, 2007). Concerning the data instrument of analysis, we used Excel Spreadsheet for all data coding, organization, and analysis. The following sections will show main findings of the content and descriptive analyses.

LITERATURE REVIEW

Entrepreneurial Orientation

Miller (1983) developed the concept of entrepreneurial orientation (EO) with three dimensions: innovativeness, proactiveness, and risk-taking. Later, Lumpkin and Dess (1996) incorporated two additional dimensions: competitive aggressiveness and autonomy. Entrepreneurial orientation is a multidimensional construct representing an entrepreneur's or firm's performance (Mohutsiwa, 2012; Carter *et al.,* 2015; Wiklund & Shepherd, 2003; Taylor, 2013). According to Lumpkin and Dess (1996), innovation facilitates the development of fresh and original ideas, innovative approaches, and experimental methods by departing from previous technological advancements. Innovativeness is defined as the capacity to adopt a forward-thinking stance and acknowledge the future desires and requirements of the mar-

ket, hence attaining a competitive advantage. Like the first-mover advantage, proactiveness was proposed as a beneficial strategic approach (Lieberman & Montgomery, 1988). Companies with a proactive orientation often have a future-oriented mindset, enabling them to predict and prepare for future developments (Dada & Fogg, 2014; Sciascia *et al.,* 2006). These firms are strongly inclined to be pioneers (Wiklund & Shepherd, 2005). According to Riviezzo and Napolitano (2014), risk-taking can be defined as the perpetual pursuit of novel prospects and the readiness to allocate financial resources toward endeavours with uncertain outcomes. The concept of autonomy generally pertains to strategic autonomy, encompassing the upper degrees or strategic aspects. This kind of autonomy empowers a team or person to address and resolve issues and establish problem definitions effectively. Promoting increased degrees of autonomy has been shown to enhance the processes of knowledge generation, dissemination, and utilization (Janz & Prasarnphanich, 2005; Smith, 2001). Competitive aggressiveness refers to the 'intensity and confrontation that new market participants typically use to compete against established competitors effectively' (Lumpkin & Dess, 1996, pp. 139).

Women's Entrepreneurial Orientation (WEO)

The existing body of research indicates that women-owned enterprises demonstrate sufficient levels of innovation to remain competitive in the market (Jyoti *et al.,* 2011; Ayub *et al.,* 2013). Ahl (2006) claims that socioeconomic circumstances influence the proactive behaviour of women. However, other research contradicts this assertion (Darmanto & Bukirom, 2021). Risk-taking is a strategic behaviour shown by firms when they consciously allocate resources to pursue initiatives that have the potential for significant rewards but also carry a considerable risk of failure (Miller & Friesen, 1982; Lumpkin & Dess, 1996). According to Deakins and Freel (2009), the effectiveness of an entrepreneur in assessing and evaluating risk is crucial for achieving success. Several studies have examined the risk-taking tendencies of women entrepreneurs. Fatoki (2014) has shown that women entrepreneurs exhibit risk-taking behaviour. However, Jan and Anwar (2022) presented contrasting findings. They argue that women entrepreneurs tend to be risk-averse. According to Lumpkin and Dess (1996), autonomy is characterized by the capacity and inclination to pursue various options independently. According to the study by Ürü *et al.* (2011), women entrepreneurs tend to use more structured and centralized approaches to manage their company operations. Competitive aggressiveness may be characterized as the inclination of a corporation to engage in aggressive strategies and surpass its rivals, as described by Lumpkin and Dess (1996). According to the study by Msoka (2013), women entrepreneurs are dedicated to engaging in assertive competitive strategies. These strategies include many actions, such as informing potential buyers about new items, showcasing their products, using persuasive communication techniques to attract clients to their businesses, and highlighting the excellent qualities of their offerings. Agrawal *et al*. (2022) also argue that women-owned enterprises provide an intriguing subject for examining the link between EO and performance due to their distinctive array of traits (Fuentes-Fuentes *et al.,* 2015). The impact of EO on the business success of women entrepreneurs working in various contexts is not well understood, despite EO being widely recognized as a crucial personal quality that contributes to company performance (Rauch *et al.,* 2009; Wales, 2016; Wales *et al.,* 2013). Accordingly, scholars are encouraged to investigate WEO (Mandongwe & Jaravaza, 2020). Hence, adopting a systematic research review (SLR) that focuses specifically on women entrepreneurs concerning their EO can deepen our comprehension of women's entrepreneurial orientation and spirit within the existing body of research (Wales, 2016).

RESULTS

Time Sequence and Journal Outlets

We first attempted to understand the time trends and journal outlets of WEO research. As shown in Table 1, we found WEO articles in 152 business and management journals. According to our analysis, the five most prolific journal outlets include *the International Journal of Entrepreneurial Behaviour and Research* with eight articles (3.92%); *the Journal of Business Venturing* with eight articles (3.92%); *International Journal of Gender and Entrepreneurship* with seven articles (3.43%), *Entrepreneurship The-*

ory and Practice with five articles (2.45%), and *International Journal of Business and Social Science* with four articles (1.96%). The journals mentioned above accounted for 15.68% of the reviewed research articles. The fragmented nature of the field is shown in the analysis of the publication ranges in Table 1. As seen, 127 journals published only one article on WEO in the first range, representing the most significant share of the total journal outlets (83.56%). The second range comprises journals that published two articles and 14 outlets (9.21%). The third range, which consists of journals that published three research articles, comprises six, representing the smallest share (3.95%). Finally, we found only five journals (4.03%) in the maximum capacity, which published more than four articles.

Table 1. Top 5 journals on WEO and publications ranges

Journal name	Database	Number of publications	Share of total	N* of outlets per publications range		Share of total
International Journal of Entrepreneurial Behaviour and Research	WoS	8	3.92%	1 Publication	127	83.56%
Journal of Business Venturing	WoS	8	3.92%	2 Publications	14	9.21%
International Journal of Gender and Entrepreneurship	WoS	7	3.43%	3 Publications	6	3.95%
Entrepreneurship Theory and Practice	WoS	5	2.45%	–	–	–
International Journal of Business and Social Science	EBSCO	4	1.96%	–	–	–
Total		32	15.68%	**Total**	152	100%

Source: own study.

The distribution of publications from 1990 to 2021 is shown in Figure 2. Results of the analysis exhibit that from 1990 to 1995, research on WEO was also almost nonexistent, with only four articles appearing in the mainstream literature (*e.g.* Sexton & Bowman, 1990; Johnson & Powell 1994). Most articles (*i.e.* 68) were published between 2011-2015 (*e.g.* Osman *et al*., 2011; Ayub *et al.,* 2013; Carter *et al.,* 2015), followed by those published from 2016 to 2021, comprising 63 articles (*e.g.* Hasan & Almubarak, 2016; White *et al.,* 2021). The publication frequency indicates that WEO has remained a hot debate among researchers, even though the literature remains scattered.

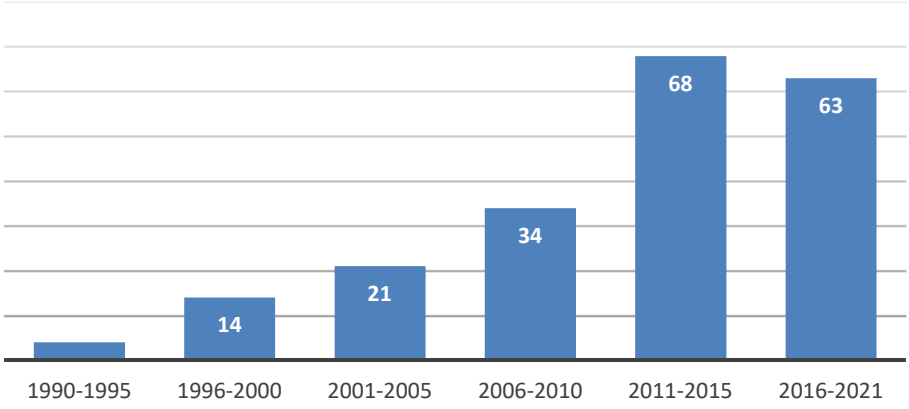

Figure 2. Distribution of publications over the period 1990-2021
Source: own elaboration.

Previous research reveals that women academics publish at a lower rate than men academics. It holds in almost every academic discipline and region despite narrowing disparities. Women are likewise under-represented in the position of first-author byline (Joanis & Patil, 2022). However, our result shown in Table 2 indicates that WEO research is primarily first authored by women. The USA tops the list with 35 article (17.15%), followed by Malaysia with nine (4.41%), UK with 8 (3.98%), Spain with six (2.94%), Canada with five (2.45%), and Turkey and India each of them with four articles (1.69%). The multiple countries with less than four articles total 50 articles, accounting for coverage of 24 % of the articles.

At the regional level, authors from North America have the highest number of first-women authored WEO articles, with 40 articles (19.60 %), followed by Australasia, with 31 articles (15.19%), Europe with 24 (11.76%), Africa with 14 (6.86%), UK with eight (3.92%), UEA with three (1.47%), and surprisingly only one article (0.49%) from South America (*e.g.* Nassif *et al.,* 2012). Thus, based on the result, we can say that there is a high number of first-women-authored WEO articles in North America, Australasia, and Europe but a deficiency in Africa, South America, and the UAE.

Table 2. First author's gender, country, and regional distribution (top 7, by country)

Country	Number of first women authors	Share of Total	Region	Number of first women authors	Share of Total
USA	35	17.15%	Africa	14	6.86%
Malaysia	9	4.41%	Australasia	31	15.19%
UK	8	3.92%	Europe	24	11.76%
Spain	6	2.94%	South America	1	0.49%
Canda	5	2.45%	North America	40	19.60%
Turkey	4	1.96%	UAE	3	1.47%
India	4	1.96%	UK	8	3.92%
Other countries < 4	50	24.50%			
Total	**121**	**59.31%**		**121**	**59.31%**

Source: own study.

Themes, Outcomes, and Drivers/Determinants

As stated earlier, the five main dimensions of EO were used to ascertain the reviewed articles' main themes or independent variables. Table 3 shows the frequency of each theme over the periods. As results show, research on *innovativeness* represents the most dominant sphere, with 60 articles (29.41%) (*e.g.* Mueller & Thomas, 2001; Park *et al.,* 2007; Kee & Rahman, 2018). The second theme with the most attention is risk-taking (*e.g.* Sexton & Bowman, 1990; Schneider, 2017; Jain & Ali, 2012), accounting for 49 articles (24.01%). It is followed by proactiveness (*e.g.* Chakraborty *et al*., 2018; Greenglass *et al*., 1999; Hussain & Malik, 2018) with 30 articles (14.70%), autonomy (*e.g.* Colakoglu, 2011) with 14 articles (6.86%), and competitive aggressiveness (*e.g.* Kozubíková *et al*., 2017) with 13 articles (6.37%). Finally, the minor area of investigation is the composite WEO, in which authors examined the EO as one construct (*e.g.* Erogul & Quagrainie, 2018; Abdullahi *et al.,* 2015; Lee & Peterson, 2000), representing 38 articles (18.62%).

Regarding the 'drivers/determinants,' research on personal factors (*e.g.* Mitra & Basit 2021) represents the dominant realm of WEO research, with a total of 23 articles (11.27%). The second most examined driver/determinant is leadership orientations (*e.g.* Arham *et al*., 2020), with eight articles (3.92%), followed by cultural orientations (*e.g.* Richard *et al*., 2004), with seven articles (3.43%), family orientations (*e.g.* Arzubiaga *et al*., 2018), with four articles (1.96%), funding support

Table 3. Themes, outcomes, and drivers/determinants

Themes of WEO		Outcomes (dependent variables)		Drivers/Determinants	
Innovativeness	**60**	Access to venture capital	5	Cultural orientations	7
Risk-taking	49	Attitude or behaviour	6	Family orientations	4
Proactiveness	30	Business creation and new products and market development	3	Funding support	3
Autonomy	14	Business/venture success	9	Leadership orientations	8
Competitive aggressiveness	13	Entrepreneurial Intentions	**17**	Personal factors	**23**
Composite WEO	38	Family development/growth	3	Religious orientations	3
		Performance (financial, non-financial, or both)	**72**	Wealth creation	3
		Others	89		
Total	**204**		**204**	**Total**	**51**

Source: own study.

(*e.g.* Lins & Lutz 2016), with three articles (1.47%), religious orientations (*e.g.* Azmi, 2017), with three articles (1.47%), wealth creation (*e.g.* DeMartino & Barbato (2003) with three articles (1.47%), in that order.

To put forward a more insightful synopsis of the maturity of WEO research over time, we conducted a cross-analysis of the connection between the research themes (independent variables) and time frame, disclosed in Table 4. It is clear from Table 4 that the time intervals with a high volume of WEO research are 2011-2015 and 2016-2021. Within this time range, it could be seen that, apart from 'innovativeness,' which witnessed a decline in the number of studies from 26 in 2011-2015 to 19 in 2016-2021 (*e.g.* Jyoti *et al.,* 2011; Ayub *et al.,* 2013), the remaining dimensions experienced massive growth. For instance, studies on 'risk-taking' increased from 16 in 2011-2015 to 24 in 2016-2021 (*e.g.* Schneider, 2017; Butkouskaya, *et al*., 2020), while 'proactiveness' grew from 10 articles in 2011-2015 to 15 in 2016-2021 (*e.g.* Chakraborty *et al.,* 2018). Generally, this analysis reinforces our earlier proposition that WEO research has gradually gained scholars' attention in mainstream research over the last decade, particularly the 'risk-taking' and proactiveness dimensions of the EO framework.

Table 4. Themes across time

Themes	Publication years						Total
	1990-1995	1996-2000	2001-2005	2006-2010	2011-2015	2016-2021	1990-2021
Innovativeness	1	3	4	7	26	19	**60**
Proactiveness	0	2	1	2	10	15	**30**
Risk-taking	0	0	2	7	16	24	**49**
Autonomy	0	2	0	1	4	7	**14**
Competitive – Aggressiveness	0	1	1	1	5	5	**13**
Composite EO	0	1	1	4	15	17	**38**

Source: own study.

Methodological Profile of Studies

The study divided the articles methodologically according to the following criteria (Table 5): research type, research approach, and study design. For the research type, empirical studies (studies that present concepts and data analysis) accounted for most of the articles 181 (88.72%) (*e.g.* Atuahene & Ko, 2001), followed by theoretical/conceptual studies (studies that focus on concepts without any data analysis), 14 articles (6.86%) (*e.g.* Lee & Peterson (2000). Furthermore, we assessed the research approaches adopted by researchers in investigating the main themes or topics under study. It was observed that quantitative studies accounted for 67.64% (138) of the articles reviewed as the leading methodology, followed by qualitative research, constituting 19.60% (40 articles), qualitative reviews 6.86% (14), and quali-quantitative 5.88% (12) (*e.g.* Gerrard *et al*., 2003; Nixdorff & Rosen, 2010). In addition, we found that most of the studies used a survey/questionnaire (63.72% (130), followed by semi-interviews 15.68% (32), interviews and questionnaires 11.27% (23), systematic reviews 6.86% (14), and panel data 2.45% (5).

Table 5. Methodological profile of articles

Research Type		research approach		Study Design	
Theoretical/Conceptual	9	Qualitative	40	Semi-interviews	32
Empirical	181	Quantitative	138	Panel data	5
Review	14	Quali-Quantitative	12	Survey/questionnaire	130
		Qualitative review	14	Interviews and questionnaire	23
				Systematic reviews	14
Total	**204**	**Total**	**204**	**Total**	**204**

Source: own study.

Likewise, a cross-analysis was conducted to understand the evolution of the research methods over the years. As shown in Figure 3, the trend of the research approach suggests a decline in the

number of studies employing qualitative and quali-quantitative studies in 2017 and 2018 (15 to nine) and (six to four), respectively (*e.g.* Montiel, 2018). Conversely, there is a significant growth in the number of studies using only the quantitative approach (32-37 between 2017 and 2018), partly due to the studies' 'performance' measurement focus (*e.g.* Azmi, 2017).

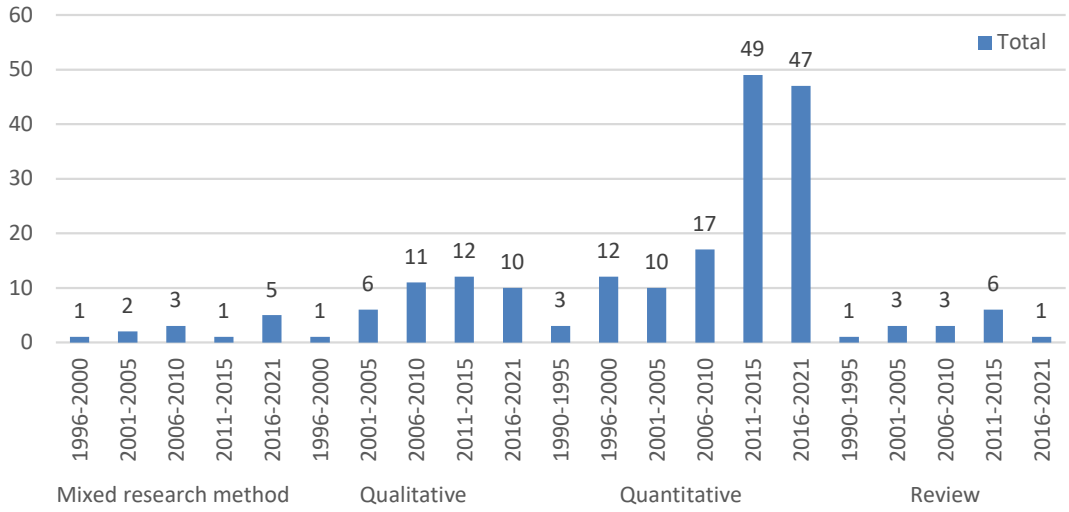

Figure 3. Research approach over the years
Source: own elaboration.

Furthermore, we performed a cross-sectional analysis to understand the interplay between the research approach and the regional focuses of the studies. This segmented analysis ascertained the research approach being used across the regional or geographical blocs. As depicted in Figure 4, a vast majority of the quantitative studies were conducted in Europe (67) and Australasia (63) (*e.g.* Byrne *et al.,* 2019) while most of the global studies (studies involving two or more countries from different continents) were largely qualitative (20).

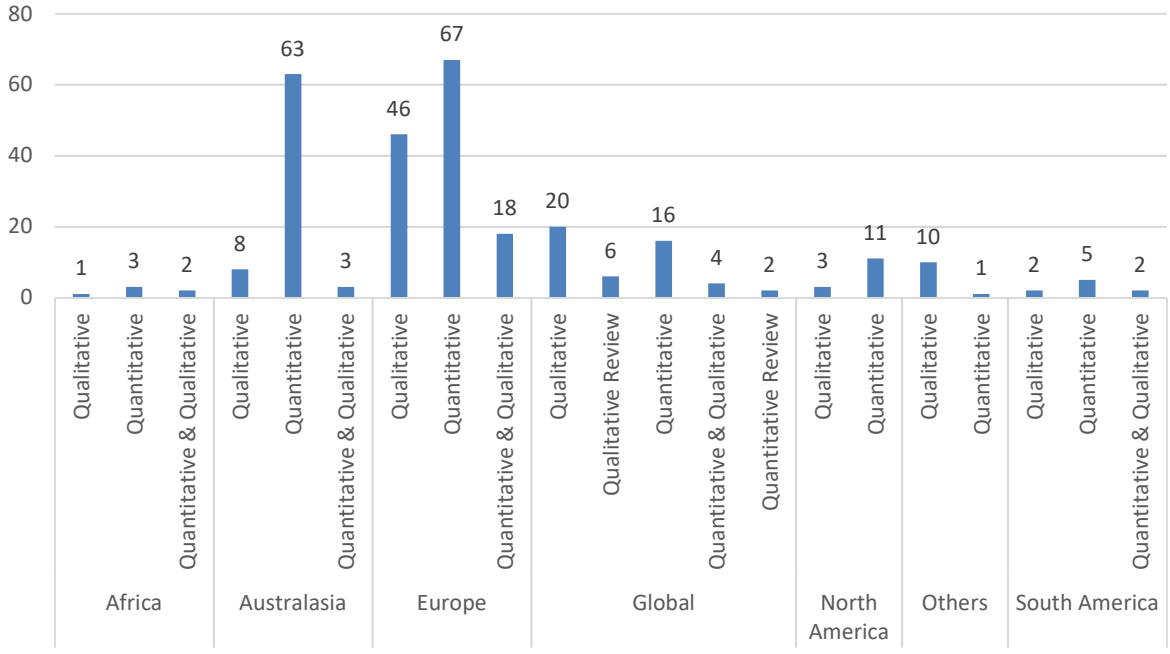

Figure 4. Research approach versus regional focus
Source: own elaboration.

Theories Employed in the Articles

Regarding the theoretical landscape of the studies, we categorized the articles into the following four groups: atheoretical, theoretical, theory-referential, and theory-relational. As our finding shows, the *theoretical studies* recorded the highest frequency, with 92 articles (45.08%) (*e.g.* Mahmood & Hanafi, 2013; Arzubiaga *et al.,* 2018), followed by *atheoretical studies* (*e.g.* Koloba, 2017), with 58 articles (28.43%), *theory-relational* (*e.g.* Schneider 2017) with 21 articles, and *theory-referential* (*e.g.* Sarri & Trihopoulou, 2005) with 18 articles, (8.82%). In terms of the specific theories employed in the studies, the seven most popular theories emerged: The theory of entrepreneurship, representing 16 articles (*e.g.* Širec & Močnik, 2012; Hasan & Almubarak, 2016; Lituchy & Reavley, 2004), is the most used. This was followed by the theory of planned behaviour (*e.g.* Yordanova & Tarrazon, 2010) with eight articles. The resource-based view of the firm (RBV) (*e.g.* Pratono & Mahmood, 2015; Mahmood & Hanafi, 2013) emerged as the third most employed theory in WEO research with six articles, with institutional theory (*e.g.* Aidis *et al.,* 2007; Yunis *et al.,* 2018), feminist theory (*e.g.* Ahl & Marlow, 2012), grounded theory (*e.g.* Bucktowar, 2015), and gender role of theory (e.g. Balachandra, 2019) constituting 5, 4, 4, and 3 articles, respectively.

Moreover, Table 6displays the sectoral focus of the studies. Our assessment shows that the most studied industry is manufacturing and service (*e.g.* Arham *et al.,* 2020) with 140 articles (68.62), followed by service (*e.g.* Loscocco *et al.,* 1991) with 38 articles (18.62%), and manufacturing (*e.g.* Akhtar, 2015) with 10 articles (4.90%). More in detail, studies in the manufacturing sector focus primarily on automotive, semiconductor, electronics, and electrical companies. It is surprising to note that agriculture research is not present within the broader scope of the WEO research.

Table 6. Theoretical landscape, specific theories, and industry focus of articles

Theoretical landscape		Specific theories (Top 7)		Industry	
Atheoretical	58	Theory of Entrepreneurship	**16**	Agriculture	0
Theoretical	92	Resource-Based View	6	Manufacturing	10
Theory referential	18	Institutional theory	5	Service	38
Theory relational	21	Theory of Planned Behaviour	8	Manufacturing and Service	140
		Feminist theory	4	NA	14
		Grounded theory	4		
		Gender role of theory	3		
Total (no. of times)	**204**		**46**	**Total**	**204**

Source: own study.

To offer further insight into the evolution of WEO theories across the period, we conducted a segmented analysis of the nexus between the research theories and time. As shown in Table 7, it is evident that there was a sharp decline in the adoption of the RBV of the firm, with a decrease from 5 in 2011-2015 to 1 in 2016-2021 (*e.g.* Hanafi, 2012; Rashid *et al.,* 2018). Similarly, even the most employed theory, the theory of entrepreneurship, has witnessed a steady decline in adoption across the periods. However, the theory of planned behaviour (TPB) is gaining significant growth, generating interest from two in 2011-2015 to four in 2016-2021 (Zhang *et al.,* 2014; Al-Mamary *et al.,* 2020). The fewer numbers presented here reveal the fragmented nature of theory usage in WEO research.

Countries and Regional Focus of Studies

Through the analysis of the national and regional focus of the studies, the study discovered that most of the studies are based in the USA (27 articles (13.23%), followed by Malaysia with 13 (6.37%) (*e.g.* Watson & Robinson, 2003; Sirivanh *et al.,* 2014), multi-country with 13 (6.5%), Pakistan with 12 (5.88%), India with 10 (4.90%), Turkey with eight (3.92%), Nigeria with seven (3.5%), Kenya with seven (3.5%), and Spain with five (2.5%). Interestingly, countries with less than five articles total 98, accounting for a coverage of 49% of the articles. At the regional level, the most researched region was Australasia with 84 articles (42%), followed by Europe with 41 (20.5%), North America with 27 (13.5%), and global studies with 19 (9.5%). Finally, South America emerged as the most under-investigated region, with only two articles (1%).

Table 7. Theories across time

Theories	Publication years						Total
	1990-1995	1996-2000	2001-2005	2006-2010	2011-2015	2016-2021	1990-2021
Theory of Entrepreneurship	0	1	3	5	4	3	**16**
Resource-Based View	0	0	0	0	5	1	**6**
Institutional theory	0	0	2	3	1	1	**5**
Theory of Planned Behaviour	0	0	1	1	2	4	**8**
Feminist theory	0	0	0	0	2	2	**4**
Grounded theory	0	0	2	1	0	1	**4**
Gender role of theory	0	1	0	1	1	0	**3**

Source: own study.

Table 8. Countries and regional focus of studies

Country Focus (Top 9)		Regional Focus	
USA	27	Africa	23
Malaysia	13	Australasia	**84**
Pakistan	12	Europe	41
India	10	Global	19
Turkey	8	North America	27
Nigeria	7	South America	2
Kenya	7	NA (reviews)	8
Spain	5	–	–
Multi-country	13	–	–
<5	98	–	–
Total	**204**	–	**204**

Source: own study.

The research also assessed the geographical trends of WEO to understand the intersection between study themes and regional focus. Table 9 shows that articles on WEO conducted in Australasia focus principally on innovativeness and risk-taking, with 24 articles (11.76%) each, followed by proactiveness with 21 articles (10.29%). In Europe, the second most studied region of WEO, the frequently examined themes are innovativeness with 19 articles (9.31%) and risk-taking with 9 (4.41%), with proactiveness, autonomy, and competitive aggressiveness amassing four articles each (1.96%). Studies conducted in North America focus mainly on innovativeness –five (2.45%), risk-taking – five (2.45%), and proactiveness – three (1.47%). Furthermore, WEO research in Africa is mainly about composite EO with six articles (2.94), followed by innovativeness five (2.45%), proactiveness four (1.96%), and risk-taking four (1.96%). The global studies, that is, the studies conducted in more than one regional bloc, are significantly concentrated on innovativeness seven (3.43), risk-taking four (1.96%), and proactiveness two (0.98%). Finally, the two studies conducted in South America, the most under-researched region, examined the composite EO (aggregate dimensions). The analysis revealed that the three most examined dimensions of EO within the women entrepreneurship domain are innovativeness, proactiveness, and risk-taking.

Table 9. Cross-analysis of study themes and the regional bloc

Themes / Focus of studies	Region of Study					
	Africa	Australasia	Europe	Global	North America	South America
Innovativeness	5	24	19	7	5	0
Proactiveness	4	21	4	2	3	0
Risk-taking	4	24	9	4	5	0
Autonomy	1	5	4	1	2	0
Competitive aggressiveness	3	5	4	2	1	0
Composite EO	6	5	1	7	11	2

Source: own study.

DISCUSSION

The primary goal of this review was to investigate the status and evolution of WEO research from 1990 to 2021. It opens dialogue and delivers relevant insight into future study direction and theory development. Thus, valuable theoretical and practical contributions are added to the study of women's entrepreneurship, explicitly focusing on WEO through a comprehensive SLR. Our results indicate that research on WEO has grown significantly in the entrepreneurship literature in the last decade, particularly in the previous five years (2011-2015). Sexton and Bowman published the first WEO study in 1990.

Regarding EO's five main dimensions, our findings revealed that research on innovativeness represents the dominant sphere. Concerning the drivers/determinants, research on personal factors represents the dominant realm of WEO research. In the context of women's entrepreneurship research, 'personal factors' refer to individual characteristics, traits, experiences, and circumstances that influence a woman's decision to become an entrepreneur, her approach to entrepreneurship, and her overall entrepreneurial journey (Linfang *et al.,* 2021). These factors can include the level of education, specific skills, and knowledge relevant to the industry or business domain (Noor & Isa, 2020). Personal goals, ambitions, and motivations drive a woman to start and sustain a business (Pauca *et al.,* 2022). Supportive or hindering influences from family, friends, or social networks (Mitra & Basit, 2021) impact her entrepreneurial decisions and actions: willingness to take risks, ability to cope with failures, and resilience in the face of challenges (Mat *et al.,* 2020).

The theoretical studies recorded the highest frequency, with the theory of entrepreneurship appearing as the most used theory among the reviewed articles, followed by the theory of planned behaviour, and the resource-based view of the firm (RBV) emerging as the third most employed theory in WEO research. In a broad sense, entrepreneurship theory focuses on identifying opportunities and making decisions to utilize them (Acs *et al.,* 2029). The TPB describes establishing entrepreneurial intention via three antecedents: attitudes, subjective norms, and perceived behavioural control (Tornikoski & Maalaoui, 2019; Ajzen, 1991). The RBV emphasizes the firm's internal resources and competencies while developing a strategy to obtain long-term competitive advantages in the marketplace (Madhani 2010).

Regarding the methodological approach, quantitative studies dominate, followed by qualitative research. Our findings reveal the involvement of women as first authors at the country and regional level of the analysed articles. In total, women wrote 121 articles, 59.31% of the total, as first authors.

CONCLUSIONS

Implications for Theory

The systematic research review on WEO contributes to advancing the theoretical understanding of women's entrepreneurship. By combining the scattered results, our study consolidates and synthesizes knowledge of WEO in this research stream. Existing research indicates that a comprehensive examination of various organizational and individual levels of EO is necessary to address the need for worldwide uniformity in academic discourse on this topic. To enhance our complete knowledge, we focus more on gender distinctions (Fellnhofer *et al.,* 2016), which is literature-based evidence crucial for their theoretical development. For instance, entrepreneurship theory enables researchers to understand the entrepreneurial progression and forecast those who would become entrepreneurs and what circumstances influence them to become entrepreneurs. However, scholars have questioned that the literature essentially presents entrepreneurship as a men activity (Nina, 1997; Brush, 1992), illustrating theories of entrepreneurship as an existence 'created by men, for men and applies to men' (Sundin & Holmquist, 1989, p. 1). Accordingly, if only dominant entrepreneurship theories are measured in developing an analytical framework to investigate WEO, some valuable understandings will be overlooked (Carter & Marlow, 2006, pp. 11-36). Moreover, not all entrepreneurship theory is designed from the feminist perspective, and no feminist theory deals with the entrepreneurship discipline (Hurley, 1999).

Our result revealed that the theory of gender roles had been employed far less frequently than other organizational theories. However, both theories better analyse the complex nature of WEO as a subject

of research inquiry. Feminist theory is employed less frequently. However, feminist theories often address gender disparities in business opportunities, resources, and societal expectations. They aim to promote equal opportunities and challenge any systemic barriers hindering women's success in entrepreneurship. Grounded theory can also be a valuable research methodology for analysing various phenomena, including women's entrepreneurship. However, few studies utilized it. The current research advances our understanding by systematically analysing and synthesizing the role of existing theories in women's entrepreneurship studies. The findings provided empirical evidence for the development of a new theory.

The current research also shows how gender influences entrepreneurial behaviour, decision-making processes, risk-taking propensities, and strategic orientations. This research adds to a deeper theoretical comprehension of the gender dynamics present within the context of women's entrepreneurship. It creates a comprehensive understanding of the subject, providing a theoretical foundation for future EO research. Examining EO in the context of women's entrepreneurship may provide valuable insights into the influence of social and cultural norms on their company strategies and practices. It can enhance theoretical frameworks that incorporate the impact of socio-cultural factors on EO. Our analysis and combination of literature can aid in developing conceptual frameworks that map out the factors influencing EO in women entrepreneurs. Our development of a conceptual framework advances knowledge in this regard. This framework contributes to theoretical advancements by providing a structured basis for understanding and analysing the field.

Moreover, this SLR helps identify gaps in the literature related to EO among women entrepreneurs. Recognizing these gaps can guide future research, allowing for a more targeted and informed exploration of relevant topics. For instance, the quantitative method has been a dominant approach. Most studies employed advanced statistical analysis, such as regressions, logistic models, and correlations, to emphasize the search for anticipated dissimilarities rather than anticipated similarities among women and men EO. Instead of comparing men and women entrepreneurs to enlarge our understanding of WEO, it would be more appropriate for research to focus on comparisons among samples of women. Our result supports Ahl (2006) and other scholars' recommendations for using innovative methods in gender-based research, such as content and discourse analysis, ethnographic study, and narrative approaches (Bruni *et al.,* 2004). The conceptual model evolving from our findings is shown in Figure 5.

Practical Implications

Several studies indicate that women entrepreneurs or managers must enhance their EO to thrive in a dynamic, fast-paced, and complex business environment (Runyan *et al.,* 2006; Mohamed & Hanafi, 2013). Insights from the SLR can encourage engaging in innovative practices and establishing a regular innovation culture to produce novel ideas and solutions for current issues or opportunities in companies run and managed by women entrepreneurs. Moreover, the findings can guide women to establish an organizational culture that promotes the acceptance of calculated risks and perceives mistakes as valuable learning opportunities. This approach may enhance the propensity of women entrepreneurs to engage in risk-taking behaviours.

Understanding EO has the potential to provide valuable guidance to women entrepreneurs in all aspects of their businesses, including strategy development, management practices, and growth methods. To foster visionary leadership, it is essential for corporate leaders to effectively communicate a well-defined vision and cultivate a forward-thinking attitude among their workforces. It entails placing emphasis on innovation and fostering a sense of growth.

Providing empirical evidence informs the development of policies and support programs tailored to the specific EO of women entrepreneurs. It ensures that initiatives are practical and effective and handle the unique needs of women entrepreneurs. Summarising, existing research through SLR helps provide valuable insights to women entrepreneurs, enabling them to make informed decisions about their ventures supporting the notion that an entrepreneurial attitude is crucial to corporate success.

Scholars argue that management training is fundamental (Wilson *et al.,* 2007; Fayolle & Klandt, 2006; Sanchez, 2013). Training in management, particularly in entrepreneurship, encompasses more than only acquiring knowledge about company initiation. It also involves cultivating entrepreneurial abilities and attitudes (Brush*,* 2014; Wilson *et al.,* 2007). Therefore, universities, training programs,

and business schools can use the findings to refine their curriculum and training modules for aspiring women entrepreneurs. Moreover, the universities and corporate bodies should ensure that education aligns with the WEO. Our findings also inform stakeholders interested in promoting diversity and inclusive entrepreneurship to provide investment and funding support to women to help them implement EO in their strategic orientations and strategies. Of course, it can lead to expanded grants and resources for women-led businesses.

Research Limitations and Recommendations

We conducted a comprehensive SLR on WEO but the study still shows some limitations. We based the procedure for categorizing the current study on prior research and our subjectivity concerning the classification of articles, although statistical analysis was done to minimize the subjective bias. Future studies can include a more significant number of articles emphasizing the WEO. We exploited restricting our search for articles to titles, subject terms, and abstracts, which may have excluded some articles. Likewise, the examination does not involve additional sources of academic knowledge, such as conference proceedings and book chapters. Therefore, future studies can include book chapters and conference proceedings for developing a more comprehensive SLR. Moreover, the research focused on the general SLR technique, but future studies can conduct the assessment using the meta-analysis technique.

Apart from the above gaps and recommendations, the following areas will need further research. The first aspect regards the EO themes. Autonomy and competitive aggressiveness are considerably less researched than other EO dimensions, but previous studies suggested these two dimensions are crucial for women entrepreneurs (De Clercq & Brieger, 2021; Rao *et al*., 2023). Thus, future studies should give more attention to them. In terms of methodology, most articles were empirical studies. Hence, future research needs to pay more attention to the theoretical/conceptual studies.

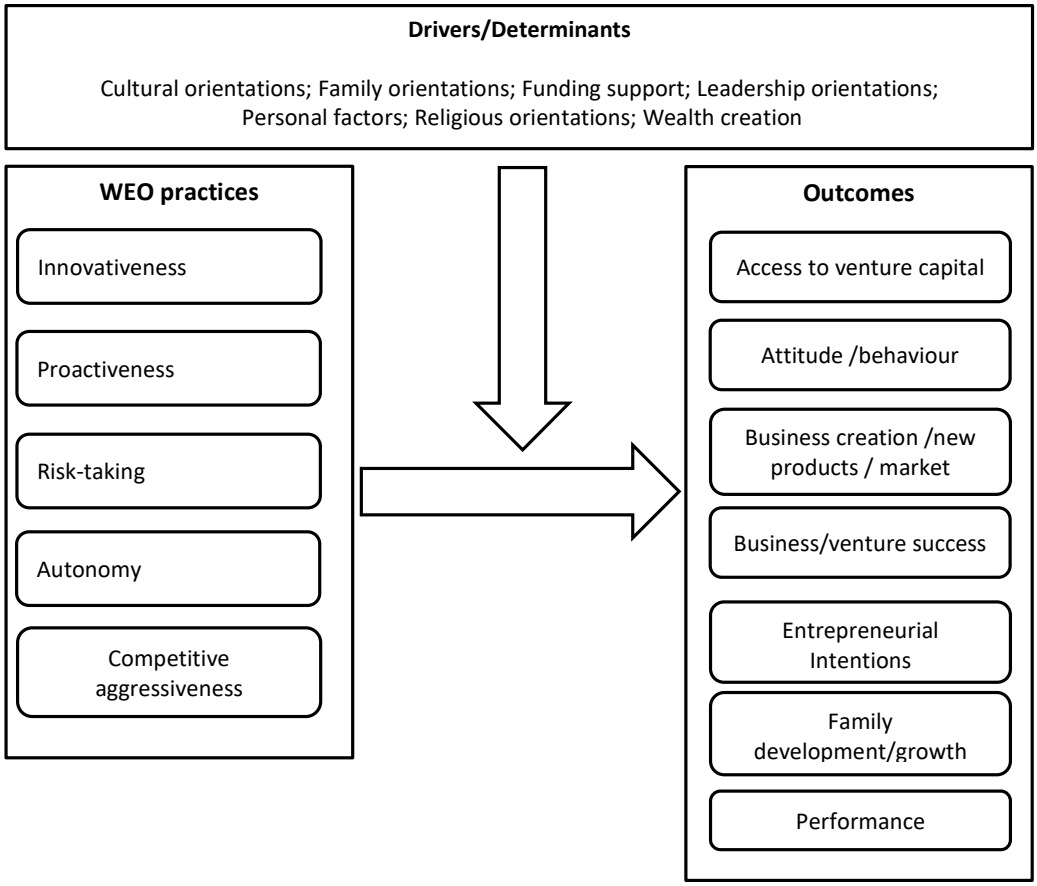

Figure 5. The WEO framework emerging from the study's findings
Source: own elaboration (2022).

Similarly, quantitative approaches dominated in the reviewed articles. Therefore, future studies must also employ qualitative methods. Through the analysis of the national and regional focus of the studies, the study found that North America and Australasia have ranked high in WEO research. To this end, Africa and South America need more investigation in future research. Moreover, the agricultural sector has yet to see a study on WEO. Therefore, we encourage future scholars to conduct more studies on EO among women entrepreneurs in the farming sector. Regarding theory utilization, future studies need to focus more on feminist theories. Grounded theory and gender role theories better analyse the complex nature of WEO as a subject of research inquiry.

REFERENCES

Abdullahi, M.S., Jakada, B.A., & Sa'ad, B. (2015). Assessing the influence of market orientation and entrepreneurial orientation on women entrepreneurs' business performance in Nigeria. *Journal of Technology Management and Technopreneurship (JTMT)*, *3*(1), 21-40. Retrieved from https://jtmt.utem.edu.my/jtmt/article/view/2280 on July 1, 2023.

Acs, Z.J., Braunerhjelm, P., Audretsch, D.B., & Carlsson, B. (2009). The knowledge spillover theory of entrepreneurship. *Small Business Economics*, *32*, 15-30. https://doi.org/10.1007/s11187-008-9157-3

Agrawal, R., Majumdar, A., Majumdar, K., Raut, R.D., & Narkhede, B.E. (2022). Attaining sustainable development goals (SDGs) through supply chain practices and business strategies: A systematic review with bibliometric and network analyses. *Business Strategy and the Environment*, *31*(7), 3669-3687. https://doi.org/10.1002/bse.3057

Ahl, H. (2006). Why research on women entrepreneurs needs new directions. *Entrepreneurship Theory and Practice*, *30*(5), 595-621. https://doi.org/10.1111/j.15406520.2006.00138

Aidis, R., Welter, F., Smallbone, D., & Isakova, N. (2007). Female entrepreneurship in transition economies: the case of Lithuania and Ukraine. *Feminist Economics*, *13*(2), 157-183. https://doi.org/10.1080/13545700601184831

Akhtar, C.S., Ismail, K., Hussain, J., & Umair-ur-Rehman, M. (2015). Investigating the moderating effect of family on the relationship between entrepreneurial orientation and success of enterprise: the case of Pakistani manufacturing SMEs. *International Journal of Entrepreneurship and Small Business*, *26*(2), 233-247. https://doi.org/10.1504/IJESB.2015.071825

Al-Mamary, Y.H.S., Abdulrab, M., Alwaheeb, M.A., & Alshammari, N.G.M. (2020). Factors impacting entrepreneurial intentions among university students in Saudi Arabia: testing an integrated model of TPB and EO. *Education+ Training*, *62*(7/8), 779-803. https://doi.org/10.1108/ET-04-2020-0096

Arham, A.F., Norizan, N.S., Muslim, N.H., & Aksan, A. (2020). Effects of gender on leadership, entrepreneurial orientation, and organizational performance. *Social and Managemen Research Journal (SMRJ)*, *17*(1), 49-60. Retrieved from https://ir.uitm.edu.my/id/eprint/13722 on February 10, 2023.

Arzubiaga, U., Kotlar, J., De Massis, A., Maseda, A., & Iturralde, T. (2018). Entrepreneurial orientation and innovation in family SMEs: Unveiling the (actual) impact of the Board of Directors. *Journal of Business Venturing*, *33*(4), 455-469, https://doi.org/10.1016/j.jbusvent.2018.03.002

Atuahene-Gima, K., & Ko, A. (2001). An empirical investigation of the effect of market orientation and entrepreneurship orientation alignment on product innovation. *Organization Science*, *12*(1), 54-74. https://doi.org/10.1287/orsc.12.1.54.10121

Ayub, A., Razzaq, A., Aslam, M.S., & Iftekhar, H. (2013). Gender effects on entrepreneurial orientation and value innovation: evidence from Pakistan. *European Journal of Business and Social Sciences*, *2*(1), 82-90. Retrieved from http://www.ejbss.com/recent.aspx on February 10, 2023.

Azmi, I.A.G. (2017). Muslim women entrepreneurs motivation in SMEs: A quantitative study in Asia Pacific countries. *Asian Economic and Financial Review*, *7*(1), 27. https://doi.org/10.18488/journal.aefr/2017.7.1/102.1.27.42

Balachandra, L. (2019). The improvisational entrepreneur: Improvisation training in entrepreneurship education. *Journal of Small Business Management*, *57*, 60-77. https://doi.org/10.1111/jsbm.12486

Bruni, A., Gherardi, S., & Poggio, B. (2004). Entrepreneur-mentality, gender and the study of women entrepreneurs. *Journal of Organizational Change Management*, *17*(3), 256-268. https://doi.org/10.1108/09534810410538315

Brush, C.G. (1992). Research on women business owners: Past trends, a new perspective, and future directions. *Entrepreneurship Theory and Practice*, *16*(4), 5-30. https://doi.org/10.1177/104225879201600401

Brush, C.G. (2014). Exploring the concept of an entrepreneurship education ecosystem. In *Innovative pathways for university entrepreneurship in the 21st century* (Vol. 24, pp. 25-39). Emerald Group Publishing Limited. https://doi.org/10.1108/S1048-4736 20140000024000

Bucktowar, R., Kocak, A., & Padachi, K. (2015). Entrepreneurial orientation, market orientation, and networking: impact on innovation and firm performance. *Journal of Developmental Entrepreneurship*, *20*(04), 1550024. https://doi.org /10.1142/S1 084946715500247

Butkouskaya, V., Llonch-Andreu, J., & Alarcón-del-Amo, M.D.C. (2020). Entrepreneurial orientation (EO), integrated marketing communications (IMC), and performance in small and medium-sized enterprises (SMEs): gender gap and inter-country context. *Sustainability*, *12*(17), 7159. https://doi.org/10.3390/su12177159

Byrne, J., Fattoum, S., & Diaz Garcia, M.C. (2019). Role models and women entrepreneurs: Entrepreneurial superwoman has her say. *Journal of Small Business Management*, *57*(1), 154-184. https://doi.org/10.1111/jsbm.12426

Caldas, C.H., Soibelman, L., & Han, J. (2002). Automated classification of construction project documents. *Journal of Computing in Civil Engineering*, *16*(4), 234-243. https://doi.org/10.1061/(ASCE)0887-3801(2002)16:4(234)

Carter, S., Mwaura, S., Ram, M., Trehan, K., & Jones, T. (2015). Barriers to ethnic minority and women's enterprise: Existing evidence, policy tensions, and unsettled que stions. *International Small Business Journal*, *33*(1), 49-69.https://doi.org /10.1177 /0266242614556823

Carter, S., & Marlow, S. (2006). Female entrepreneurship: theoretical perspectives and empirical evidence. In *Female Entrepreneurship* (pp. 11-36). Routledge.

Chakraborty, T., Gupta, D., & Chatterjee, B. (2018). "Strong, yet we are vulnerable": role of psychological factors and financial affluence on women's entrepreneurial success. *Journal for Global Business Advancement*, *11*(6), 726-752. https://doi .org/10.1504/JGBA.2018.097779

Colakoglu, S.N. (2011). The impact of career boundarylessness on subjective career success: The role of career competencies, career autonomy, and career insecurity. *Journal of Vocational Behavior*, *79*(1), 47-59. https://doi.org/10.1016/j.jvb.2010.09.011

Cortes, A.F., Lee, Y., Cortes, J.D., & Liñan, I. (2021). Entrepreneurial orientation in supply chain management: a systematic review. *International Journal of Entrepreneurial Knowledge*, *9*(1), 127-43. https://doi.org/10.37335/ijek.v9i1.127

Crossan, M.M., & Apaydin, M. (2010). A multidimensional framework of organizational innovation: A systematic review of the literature. *Journal of Management Studies*, *47*(6), 1154-1191. https://doi.org/10.1111/j.1467-6486.2009.00880.x

Dada, O., & Fogg, H. (2016). Organizational learning, entrepreneurial orientation, and the role of university engagement in SMEs. *International Small Business Journal*, *34*(1), 86-104. https://doi.org/10.1177/0266242614542852

Darmanto, S., & Bukirom, B. (2021). The effect of entrepreneurial experience and entrepreneurial orientation on social entrepreneurial performance. *Management Science Letters*, https://doi.org/*11*(4), 1133-1140. 10.5267/j.msl.2020.11.026

Dawson, C., & Henley, A. (2012). "Push" versus "pull" entrepreneurship: an ambiguous distinction?. *International Journal of Entrepreneurial Behavior & Research*, *18*(6), 697-719. https://doi.org/10.1108/13552551211268139

Deakins, D., & Freel, M.S. (2009). Entrepreneurial activity, the economy, and the importance of small firms. *Entrepreneurship and small firms. McGraw-Hill Education*, *6*.

DeMartino, R., & Barbato, R. (2003). Differences between women and men MBA entrepreneurs: Exploring family flexibility and wealth creation as career motivators. *Journal of Business Venturing*, *18*(6), 815-832. https://doi.org/10.1016/S0883-9026(03)00003-X

De Clercq, D., & Brieger, S.A. (2021). When discrimination is worse, autonomy is key: How women entrepreneurs leverage job autonomy resources to find work–life balance. *Journal of Business Ethics*, 1-18. https://doi.org/10.1007/s10551-021-04735-1

Deng, F., & Smyth, H. (2013). Contingency-based approach to firm performance in construction: Critical review of empirical research. *Journal of Construction Engineering and Management*, *139*(10), 04013004. https://doi.org/10.1061/(ASCE)CO.1943-7862.0000738

Erogul, M.S., & Quagrainie, F.A. (2018). Conceptualizing entrepreneurial orientation dimensions and female business performance in developing economies. *Journal for International Business and Entrepreneurship Development*, *11*(2),118-139. https://doi.org/10.1504/JIBED.2018.091213

Fatoki, O. (2014). The entrepreneurial intention of undergraduate students in South Africa: The influences of entrepreneurship education and previous work experience.*Mediterranean Journal of Social Sciences*, *5*(7), 294. https://doi.org/10.5901/mjss.2014.v5n7p294

Fayolle, A., & Klandt, H. (2006). Issues and newness in the field of entrepreneurship education: new lenses for new practical and academic questions. *International Entrepreneurship Education: Issues and Newness*, 1-17.

Fellnhofer, K., Puumalainen, K., & Sjögrén, H. (2016). Entrepreneurial orientation and performance are sexes equal?. *International Journal of Entrepreneurial Behavior & Research*, *22*(3), 346-374. https://doi.org/ 10.1108/IJEBR-12-2015-0286

Fuentes-Fuentes, M.D.M., Bojica, A.M., & Ruiz-Arroyo, M. (2015). Entrepreneurial orientation and knowledge acquisition: effects on performance in the specific context of women-owned firms. *International Entrepreneurship and Management Journal*, *11*, 695-717. https://doi.org/10.1007/s11365-014-0336-1

Furrer, O., Thomas, H., & Goussevskaia, A. (2008). The structure and evolution of the strategic management field: A content analysis of 26 years of strategic management research. *International Journal of Management Reviews*, *10*(1), 1-23. https://doi.org/10.1111/j.1468-2370.2007.00217.x

Guthrie, J., & Murthy, V. (2009). Past, present and possible future developments in human capital accounting: a tribute to Jan-Erik Gröjer. *Journal of Human Resource Costing & Accounting*, *13*(2), 125-142. https://doi.org/10.1108/14013380910968647

Gartner, W.B., Carter, N.M., & Reynolds, P.D. (2010). Entrepreneurial behavior: Firm organizing processes. *Handbook of Entrepreneurship Research: An Interdisciplinary Survey and Introduction*, 99-127. https://doi.org/10.1007/978-1-4419-1191-9_5

Gerrard, P., Schoch, H., & Barton Cunningham, J. (2003). Values and skills of female entrepreneurs in Vietnam: an exploratory study. *Asia Pacific Business Review*, *10*(2), 139-159. https://doi.org/10.1080/13602380410001677182

Goktan, A.B., & Gupta, V.K. (2015). Sex, gender, and individual entrepreneurial orientation: evidence from four countries. *International Entrepreneurship and Management Journal*, *11*, 95-112. https://doi.org/10.1007/s11365-013-0278-z

Greenglass, E., Schwarzer, R., Jakubiec, D., Fiksenbaum, L., & Taubert, S. (1999, July). The proactive coping inventory (PCI): A multidimensional research instrument. In *20th International Conference of the Stress and Anxiety Research Society (STAR), Cracow, Poland* (Vol. 12, p. 14). https://doi.org/10.1037/t07292-000

Hanafi, N. (2012). *Business performance of women-owned SMEs in Malaysia: Learning and entrepreneurial orientations and the mediating roles of competitive advantage* (Doctoral dissertation, Universiti Utara Malaysia). Retrieved from https://etd.uum.edu.my/id/eprint/3777 on July 1, 2023.

Hasan, F.S., & Almubarak, M.M.S. (2016). Factors influencing women entrepreneurs' performance in SMEs. *World Journal of Entrepreneurship, Management and Sustainable Development*, *12*(2). https://doi.org/10.1186/s13731-021-00145-9

Henry, C., Foss, L., Fayolle, A., Walker, E., & Duffy, S. (2015). Entrepreneurial leadership and gender: Exploring theory and practice in global contexts. *Journal of Small Business Management*, *53*(3), 581-586. https://doi.org/10.1111/jsbm.12174

Holmquist, C., & Carter, S. (2009). The Diana Project: Pioneering Women Studying Pioneering Women. *Small Business Economics*, *32*, 121-128. https://doi.org/10.1007/s11187-008-9151-9

Hussain, S., & Imran Malik, M. (2018). Towards nurturing the entrepreneurial intentions of neglected female business students of Pakistan through proactive personality, self-efficacy, and university support factors. *Asia Pacific Journal of Innovation and Entre preneurship*, *12*(3), 363-378. https://doi.org/10.1108/APJIE-03-2018-0015

Jain, R., & Ali, S.W. (2012). Personal characteristics of Indian entrepreneurs and intrapreneurs: an empirical study. *Management and Labour Studies*, *37*(4), 295-322.

Jan, S., & Anwar, A. (2022). Strategic entrepreneurship in light of entrepreneurial and strategic orientations: A case of women entrepreneurs of Jammu and Kashmir in India. *Journal of Public Affairs*, *22*(4), e2612. https://doi.org/10.1177/0258042X134848

Janz, B.D., & Prasarnphanich, P. (2005). Understanding knowledge creation, transfer, and application: Investigating cooperative, autonomous systems development teams. In *Proceedings of the 38th Annual Hawaii International Conference on System Sciences* (pp. 248a-248a). Retrieved from IEEE.https://dio.org 10.1109/HICSS.2005.648 on July 1, 2023.

Jennings, J.E., & Brush, C.G. (2013). Research on women entrepreneurs: challenges to (and from) the broader entrepreneurship literature. *The Academy of Management Annals*, *7*(1), 663-715. https://doi.org/10.1080/19416520.2013.782190

Jiang, W., Chai, H., Shao, J., & Feng, T. (2018). Green entrepreneurial orientation for enhancing firm performance: A dynamic capability perspective. *Journal of Cleaner Production*, *198*, 1311-1323. https://doi.org/10.1016/j.jclepro.2018.07.104

Johnson, J.E., & Powell, P.L. (1994). Decision making, risk and gender: Are managers different?. *British Journal of Management*, *5*(2), 123-138. https://doi.org/ 10.1111 /j.1467-8551.1994.tb00073.x

Joanis, S.T., & Patil, V.H. (2022). First-author gender differentials in business journal publishing: top journals versus the rest. *Scientometrics*, *127*(2), 733-761. https:// doi.org/10.1007/s11192-021-04235-z

Jyoti, J., Sharma, J., & Kumari, A. (2011). Factors affecting orientation and satisfaction of wo men entrepreneurs in rural India. *Annals of Innovation & Entrepreneurship*, *2*(1), 5813. https://doi.org/10.3402/aie.v2i1.7371

Kee, D., & Rahman, N. (2018). Effects of entrepreneurial orientation on start-up success: A gender perspective. *Management Science Letters*, *8*(6), 699- 706. http://doi.org/ 10.5267/j.msl.2018.4.012

Kelley, D.J., Baumer, B.S., Brush, C., Greene, P.G., Mahdavi, M., Majbouri, M., ... & Heavlow, R. (2017). Women's Entrepreneurship 2016/2017 report. *Global Entrepreneurship Research Association*, *9*(19), 2017. Retrieved from https://scholarworks.smith.edu/conway_research/1 on February 11, 2023.

Kozubíková, L., Sopková, G., Krajčík, V., & Tyll, L. (2017). Differences in innovativeness, proactiveness, and competitive aggressiveness in relation to entrepreneurial motives. *Journal of International Studies*. http://doi.org/10.14254/2071-8330.2017/10-4/16

Kundu, S.C., & Rani, S. (2004). Entrepreneurial orientation of aspiring managers: a study. *International Journal of Management and Enterprise Development*, *1*(3), 233-250. https://doi.org/10.1504/IJMED.2004.004523

Kundu, S.C., & Rani, S. (2016). Female aspirant human resources' entrepreneurial orientation: a study in Indian context. *Management Research Review*, *39*(2), 235-263. *l*, *32*(2), 139-158. https://doi.org/10.1108/MRR-11-2015-0267

Lee, S.M., & Peterson, S.J. (2000). Culture, entrepreneurial orientation, and global competitiveness. *Journal of World Business*, *35*(4), 401-416. https://doi.org/10.1016/S1090-9516 (00)00045-6

Lewis, S. (2015). Qualitative inquiry and research design: Choosing among five approaches. *Health Promotion Practice*, *16*(4), 473-475. https://doi.org/10.1177/1524839915580941

Lieberman, M.B., & Montgomery, D.B. (1988). First-mover advantages. *Strategic Management Journal*, *9*(S1), 41-58. https://doi.org/10.1002/smj.4250090706

Lins, E., & Lutz, E. (2016). Bridging the gender funding gap: do female entrepreneurs have equal access to venture capital?. *International Journal of Entrepreneurship and Small Business*, *27*(2-3), 347-365 https://doi.org/10.1504/IJESB.2016.073993

Linfang, Z., Khalid, R., Raza, M., Chanrawang, N., & Parveen, R. (2021). The impact of psychological factors on women entrepreneurial inclination: the mediating role of self leadership. *Frontiers in Psychology*, *12*, 796272. https://doi.org/10.3389 /fpsyg. 2021.796272

Lituchy, T.R., & Reavley, M.A. (2004). Women entrepreneurs: A comparison of international small business owners in Poland and the Czech Republic. *Journal of International Entrepreneurship*, *2*, 61-87. https://doi.org/10.1023/B:JIEN.0000026906.28190.df

Loscocco, K.A., Robinson, J., Hall, R.H., & Allen, J.K. (1991). Gender and Small Business Success: An inquiry into women's relative disadvantage. *Social Forces*, *70*(1), 65-85. https://doi.org/10.1093/sf/70.1.65

Lu, D., Chen, Q., Wang, G., Liu, L., Li, G., & Moran, E. (2016). A survey of remote sensing-based aboveground biomass estimation methods in forest ecosystems. *International Journal of Digital Earth*, *9*(1), 63-105. https://doi.org/10.1080/17538947.2014.990526

Lumpkin, G.T., & Dess, G.G. (1996). Clarifying the entrepreneurial orientation construct and linking it to performance. *Academy of Management Review*, *21*(1), 135-172. https:/ /doi.org/10.5465/amr.1996.9602161568

Madhani, P.M. (2010). The resource-based view (RBV): issues and perspectives. *PACE, A Journal of Research of Prestige Institute of Management*, *1*(1), 43-55. Retrieved from https:// ssrn.com /abstract=1579837 on July 1, 2023.

Mahmood, R., & Hanafi, N. (2013). Entrepreneurial orientation and business performance of women-owned small and medium enterprises in Malaysia: Competitive advantage as a mediator. *International Journal of Business and Social Science (IJBSS)*, *4*(1), 82-90. Retrieved from https://repo.uum.Edu.My/id/print/12295 on July 1, 2023.

Mat, Z., Yusoff, M., Zainol, F., & Afthanorhan, A. (2020). Risk-taking propensity & personality of women entrepreneurs in Malaysia. *Journal Critical Review*, *7*, 1214-1221. https://doi.org/10.31838/jcr.07.06.217

Mehrabi, H., Coviello, N., & Ranaweera, C. (2019). Ambidextrous marketing capabilities and performance: How and when entrepreneurial orientation makes a difference. *Industrial Marketing Management*, *77*, 129-142. https://doi.org/10.1016/j.indmarman.2018.11 .014

Miller, D. (1983). The correlates of entrepreneurship in three types of firms. *Management Science*, *29*(7), 770-791. https://doi.org/10.1287/mnsc.29.7.770

Miller, D., & Friesen, P.H. (1982). Innovation in conservative and entrepreneurial firms: Two models of strategic momentum. *Strategic Management Journal*, *3*(1), 1-25. https://doi.org/10.1002/smj.4250030102

Mitra, J., & Basit, A. (2021). Personal networks and growth aspirations: a case study of second generation, Muslim, female entrepreneurs. *Small Business Economics*, *56*, 121-143. https://doi.org/10.1007/s11187-019-00211-3

Mahmood, R., & Hanafi, N. (2013). Entrepreneurial orientation and business performance of women-owned small and medium enterprises in Malaysia: Competitive advantage as a mediator. *International Journal of Business and Social Science (IJBSS)*, *4*(1), 82-90. Retrieved from http://ijbssnet.com/index.php/home on July 2, 2023.

Mohutsiwa, M. (2012). *Strategic entrepreneurship and performance of small and medium enterprises in South Africa* (Doctoral dissertation). Retrieved from http://hdl.handle.net /10539 /12127 on July 1, 2023.

Montiel-Campos, H. (2018). Entrepreneurial orientation and market orientation: Systematic literature review and future research. *Journal of Research in Marketing and Entrepreneurship*, *20*(2), 292-322. https://doi.org/10.1108/JRME-09-2017-0040

Msoka, E.M. (2013). Do entrepreneurship skills have an influence on the performance of women-owned enterprises in Africa? Case of micro and small enterprises in Dar es Salaam, Tanzania. *International Journal of Business, Humanities and Technology*, *3*(3), 62. Retrieved from https://api.semanticscholar.org/CorpusID:168484784 on February 11, 2023.

Mueller, S.L., & Thomas, A.S. (2001). Culture and entrepreneurial potential: A nine country study of locus of control and innovativeness. *Journal of Business Venturing*, *16*(1), 51-75. https://doi.org/10.1016/S0883-9026(99)00039-7

Mwaura, A.T.W., Gathenya, J.W.D., & Kihoro, J. (2015). Dynamics of entrepreneurial orientation on the performance of women-owned enterprises in Kenya. *International Journal of Academic Research in Business and Social Sciences*. Retrieved from http://hdl.handle.net/123456789/210 on July 2, 2023.

Nassif, V.M.J., Andreassi, T., Tonelli, M.J., & Fleury, M.T.L. (2012). Women entrepreneurs: Discussion about their competencies. *African Journal of Business Management*, *6*(26), 7694.https://doi.org/:10.5897/AJBM11.1347

Neuendorf, K.A., Gore, T.D., Dalessandro, A., Janstova, P., & Snyder-Suhy, S. (2010). Shaken and stirred: A content analysis of women's portrayals in James Bond films. *Sex Roles*, *62*, 747-761. https://doi.org/10.1007/s11199-009-9644-2

Nina Gunnerud, B. (1997). Gender, place, and entrepreneurship. *Entrepreneurship & Regional Development*, *9*(3), 259-268. https://doi.org/10.1080/08985629700000015

Nixdorff, J.L., & Rosen, T.H. (2010). The glass ceiling women face: An examination and proposals for development of future women entrepreneurs. *New England Journal of Entrepreneurship*, *13*(2), 71-87. https://doi.org/10.1108/NEJE-13-02-2010-B006

Noor, S., & Isa, F.M. (2020). Contributing factors of women entrepreneurs' business growth and failure in Pakistan. *International Journal of Business and Globalisation*, *25*(4), 503-518. https://doi.org/10.1108/NEJE-13-02-2010-B006

Oduro, S., Maccario, G., & De Nisco, A. (2021). Green innovation: a multidomain systematic review. *European Journal of Innovation Management*, *25*(2), 567-591. https:// doi.org/10.1108/EJIM-10-2020-0425

Osman, M.H.M., Ahmad, F.S., Rashid, M.A., & Hussain, G.(2011). Assimilating entrepreneurial orientation and market orientation dimensions in the context of women-owned small and medium sized businesses. *African Journal of Business Management*, *5*(14), 5974. https://doi.org/10.5897/AJBM11.686

Park, H.J., Burns, L.D., & Rabolt, N.J. (2007). Fashion innovativeness, materialism, and attitude toward purchasing foreign fashion goods online across national borders: The moderating effect of internet innovativeness. *Journal of Fashion Marketing and Management: An International Journal*, *11*(2), 201-214. https://doi.org/10.1108/13612020710751383

Pauca, M.A.V., Vásquez, M.E.Z., Acobo, R.Y.C., & Gonzáles, J.L.A. (2022). Factors that influence the decision of Peruvian women to become entrepreneurs. *Revista Venez olana de Gerencia: RVG*, *27*(8), 1036-1047. https://doi.org/10.52080/rvgluz.27.8.20

Petticrew, M., & Roberts, H. (2008). *Systematic reviews in the social sciences: A practical guide*. John Wiley & Sons. https://goi.org/10.1002/9780470754887

Popescu, S. (2012). Women and men in entrepreneurship. *Journal of Knowledge Management, Economics, and Information Technology*, *2*(4), 1-10. Retrieved from https://www.scientificpapers.org/s=+Women+and+men+in+ entrepreneurship on February 11, 2023.

Pratono, A.H., & Mahmood, R. (2015). Mediating effect of marketing capability and reward philosophy in the relationship between entrepreneurial orientation and firm performance. *Journal of Global Entrepreneurship Research*, *5*, 1-12. https://doi.org/10.1186/s40497-015-0023-x

Rao, S.A., Kareem Abdul, W., Kadam, R., & Singh, A. (2023). Factors affecting the performance of micro-level women entrepreneurs: a comparative study between UAE and India. *Measuring Business Excellence*. https://doi.org/10.1108/MBE-02-2022-0034

Rashid, U.K., Nasuredin, J., Net., S.N.W., Yusoff, W.F.W., Omar, S.S., & Harun, A. (2018). Entrepreneurial management, entrepreneurial orientation, and women-owned SMEs business performance: A conceptual framework. *Journal for Studies in Management and Planning*, *4*. Retrieved from https://pen2print.org/index.php/jsmap/issue/view/252 on February 14, 2023.

Rauch, A., Wiklund, J., Lumpkin, G.T., & Frese, M. (2009). Entrepreneurial orientation and business performance: An assessment of past research and suggestions for the future. *Entrepreneurship Theory and Practice*, *33*(3), 761-787. https://doi .org/10.1111/j.1540-6520.2009.00308.x

Richard, O.C., Barnett, T., Dwyer, S., & Chadwick, K. (2004). Cultural diversity in management, firm performance, and the moderating role of entrepreneurial orientation dimensions. *Academy of Management Journal*, *47*(2), 255-266. https://doi.org/10. 5465/ 20159576

Riviezzo, A., & Napolitano, M.R. (2014). Orientamento imprenditoriale e performance: un'indagine tra le università italiane (Entrepreneurial orientation and performance: a survey among Italian universities). *Sinergie Italian Journal of Management*, *32*(Jan-Apr), 193-212. https://doi.org/10.7433/s93.2014.12

Runyan, R.C., Huddleston, P., & Swinney, J. (2006). Entrepreneurial orientation and social capital as small firm strategies: A study of gender differences from a resource-based view. *The International Entrepreneurship and Management Journal*, *2*, 455-477. https://doi.org/10.1007/s11365-006-0010-3

Sampaio, R.F., & Mancini, M.C. (2007). Systematic review studies: a guide for careful synthesis of the scientific evidence. *Brazilian Journal of Physical Therapy*, *11*, 83-89. https://doi.org/10.1590/S1413-35552007000100013

Sánchez, J.C. (2013).The impact of an entrepreneurship education program on entrepreneurial competencies and intention. *Journal of Small Business Management*, *51*(3), 447-465. https://doi.org/10.1111/jsbm.12025

Sarri, K., & Trihopoulou, A. (2005). Female entrepreneurs' personal characteristics and motivation: a review of the Greek situation. *Women in Management Review*, *20*(1), 24-36. https://doi.org/10.1108/09649420510579559

Schneider, K. (2017). Entrepreneurial competencies of women entrepreneurs of micro and small enterprises. *Science Journal of Education*, *5*(6), 252-261. https://doi.org/10.11648/j.sj edu.20170506.14

Sciascia, S., Naldi, L., & Hunter, E. (2006). Market orientation as a determinant of entrepreneurship: An empirical investigation on SMEs. *The International Entrepreneurship and Management Journal*, *2*, 21-38. https://doi.org/10.1007/s11365- 006-7087-6

Sexton, D.L., & Bowman-Upton, N. (1990). Female and male entrepreneurs: Psychological characteristics and their role in gender-related discrimination. *Journal of Business Venturing*, *5*(1), 29-36. https://doi.org/10.1016/0883-9026(90)90024-N

Širec, K., & Močnik, D. (2012). Gender specifics in entrepreneurs' personal characteristics. *Journal for East European Management Studies*, 11-39. Retrieved from http://hdl.handle.net/104 19/840 91 on February 14, 2023.

Smith, E.A. (2001). The role of tacit and explicit knowledge in the workplace. *Journal of Knowledge Management*, *5*(4), 311-321. https://doi.org/10.1108/13673270110411733

Sirivanh, T., Sukkabot, S., & Sateeraroj, M. (2014). The effect of entrepreneurial orientation and competitive advantage on SMEs' growth: A structural equation modeling study. *International Journal of Business and Social Science*, *5*(6). Retrieved from https://api.semanticscholar.org/CorpusID:2725797 on February 9, 2023.

Solikahan, E.Z., & Mohammad, A. (2018, December). Entrepreneurial Orientation Literature Review: Measurement. In *Journal of International Conference Proceedings*, https://doi.org/10.32535/jicp.v1i2.268

Sundin, E., & Holmquist, C. (1989). Kvinnor som företagare: Osynlighet, mångfald, anpassning, Malmö, Liber. [Women as entrepreneurs: Invisibility, diversity, adjustment Retrieved from diva2:930193 on February 9, 2023.

Taylor, P. (2013). The effect of entrepreneurial orientation on the internationalization of SMEs in developing countries. *African Journal of Business Management*, *17*, 19-21. Retrieved from https://ssrn.com/abstract=2323672 on February 9, 2023.

Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a methodology for developing evidence- informed management knowledge by means of systematic review. *British Journal of Management*, *14*(3), 207-222. https://doi.org/10.1111/1467-8551.00375

Tornikoski, E., & Maalaoui, A. (2019). Critical reflections–The Theory of Planned Behaviour: An interview with Icek Ajzen with implications for entrepreneurship research. *International Small Business Journal*, *37*(5), 536-550. https://doi.org/10.1177/0266242619829681

Ürü, F.O., Çalıskan, S.C., Atan, Ö., & Aksu, M. (2011). How much do entrepreneurial characteristics matter in strategic decision-making?. *Procedia-social and Behavioral Sciences*, *24*, 538-562. https://doi.org/10.1016/j.sbspro.2011.09.112

Vuori, V., & Väisänen, J. (2009). The use of social media in gathering and sharing competitive intelligence. Retrieved from https://aisel.aisnet.org/iceb2009/6 on February 15, 2023.

Wales, W.J. (2016). Entrepreneurial orientation: A review and synthesis of promising research directions. *International Small Business Journal*, *34*(1), 3-15. https://doi.org/10.1177/0266242615613840

Wales, W.J., Gupta, V.K., & Mousa, F.T. (2013). Empirical research on entrepreneurial orientation: An assessment and suggestions for future research. *International Small Business Journal*, *31*(4), 357-383. https://doi.org/10.1177/0266242611418261

Watson, J., & Robinson, S. (2003). Adjusting for risk in comparing the performances of male- and female-controlled SMEs. *Journal of Business Venturing*, *18*(6), 773-788. https://doi.org/10.1016/S0883-9026(02)00128-3

Weick, K.E. (1995). What theory is not, theorizing is. *Administrative Science Quarterly*, *40*(3), 385-390. https://doi.org/10.2307/2393789

Welter, F., Brush, C., & De Bruin, A. (2014). The gendering of entrepreneurship context. *Institut für Mittelstandsforschung Bonn (Hrsg.): Working Paper*, *1*, 14. https://doi.org/10.2139/ssrn.2557272

Whetten, D.A. (1989). What constitutes a theoretical contribution?. *Academy of Management Review*, *14*(4), 490-495. https://doi.org/10.5465/amr.1989.4308371

White, J.V., Chaudhary, S., & Gupta, V.K. (2021). Measurement of entrepreneurial orientation: A systematic critical synthesis of the empirical literature. In *Entrepreneurial Orientation: Epistemological, Theoretical, and Empirical Perspectives* (Vol. 22, pp. 223-245). Emerald Publishing Limited. https://doi.org/10.1108/S1074-754020210000022009

Wiklund, J., & Shepherd, D. (2003). Knowledge-based resources, entrepreneurial orientation, and the performance of small and medium-sized businesses. *Strategic Management Journal*, *24*(13), 1307-1314. https://doi.org/10.1002/smj.360

Wiklund, J., & Shepherd, D. (2005). Entrepreneurial orientation and small business performance: a configurational approach. *Journal of Business Venturing*, *20*(1), 71-91. https://doi.org/10.1016/j.jbusvent.2004.01.001

Williams, B.C., & Plouffe, C.R. (2007). Assessing the evolution of sales knowledge: A 20- year content analysis. *Industrial Marketing Management*, *36*(4), 408-419. https://doi.org/10.1016/j.indmarman.2005.11.003

Wilson, F., Kickul, J., & Marlino, D. (2007). Gender, entrepreneurial self–efficacy, and entrepreneurial career intentions: Implications for entrepreneurship education. *Entrepartnership Theory and Practice*, *31*(3), 387-406. https://doi.org/10.1111/j.1540-6520.2007.00179.x

Yordanova, D.I., & Tarrazon, M.A. (2010). Gender differences in entrepreneurial intentions: evidence from Bulgaria. *Journal of Developmental Entrepreneurship*, *15*(03), 245-261. https://doi.org/10.1142/S1084946710001543

Yunis, M.S., Hashim, H., & Anderson, A.R. (2018). Enablers and constraints of female entrepreneurship in Khyber Pakhtunkhwa, Pakistan: Institutional and feminist perspectives. *Sustainability*, *11*(1), 27. https://doi.org/10.3390/su11010027

Zhang, Y., Duysters, G., & Cloodt, M. (2014). The Role of Entrepreneurship Education as a Predictor of University Students' Entrepreneurial Intention. *International Entrepreneurship and Management Journal*, *10*, 623-641. https://doi.org/10.1007/s11365-012-0246-z

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Acknowledgements and Financial Disclosure

The authors received no financial support for the research, authorship, and/or publication of this article.

Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Published by Krakow University of Economics – Krakow, Poland

Ministry of Education and Science
Republic of Poland

The journal is co-financed in the years 2022-2024 by the Ministry of Education and Science of the Republic of Poland in the framework of the ministerial programme “Development of Scientific Journals” (RCN) on the basis of contract no. RCN/SP/0583/2021/1 concluded on 13 October 2022 and being in force until 13 October 2024.

Entrepreneurial Business and Economics Review

2024, Vol. 12, No. 2

10.15678/EBER.2024.120203

Women on management board and firm performance: Evidence from the Visegrad Group companies

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ABSTRACT

Objective: The aim of this study is to investigate the relationship between the presence of women on management boards and firm performance in publicly traded companies within the Visegrad Group countries during the 2019-2021 period.

Research Design & Methods: The study focuses on 451 publicly traded companies in the Visegrad Group countries over the 2019-2021 period, examining the composition of management boards in terms of gender diversity. The study uses four types of characteristics to describe the management board's composition, including the presence of women on the board, the percentage of female directors, Blau's index of heterogeneity, and the gender of the CEO. The t-tests, Mann-Whitney U tests, and data regression are applied to investigate the influence of female managers on company efficiency, as well as market performance.

Findings: The data shows that only 32.8% of companies have at least one woman on their management board and the average share of women on these boards is low at 12%. We found a positive relationship between operating efficiency and the percentage of women on the management board and board gender diversity, but no statistically significant association between women's presence on the management board and market performance. Our study supports the hypothesis that a woman's presence on the management board affects firm performance.

Implications & Recommendations: The findings can be valuable and may have practical implications for policymakers and company executives. Policymakers can use this information to support and promote policies that encourage gender diversity in corporate leadership. Companies interested in promoting diversity can use this information to support their efforts to increase female representation on their management boards and potentially improve their performance.

Contribution & Value Added: This study contributes to the ongoing discussion on gender diversity in corporate leadership and its potential impact on firm performance. Thus, it might affect the behaviour of companies operating in similar institutional environment, namely in Visegrad Group countries. We used different measures of firm performance – both based on the operating (accounting) data and market data. We included several measures of women's presence on the boards (e.g. Blau index or women as the CEO).

Article type:	research article
Keywords:	board gender diversity; operating performance; market performance; the Visegrad Group; two-tier corporate governance system
JEL codes:	G30, G39

Received: 18 March 2023 Revised: 30 October 2023 Accepted: 13 December 2023

Suggested citation:
Bukalska, E., Sosnowski, T., & Wawryszuk-Misztal, A. (2024). Women on management board and firm performance: Evidence from the Visegrad Group companies. *Entrepreneurial Business and Economics Review,* 12(2), 43-59. https://doi.org/10.15678/EBER.2024.120203

INTRODUCTION

The issue of women on board attracts many researchers. There are several theories used to support appointing women to the board (*i.e.* resource dependence theory, agency theory, human capital theory, social capital theory) but there are also others providing arguments against gender diversity of boards (*i.e.* the self-categorization theory and the social identity theory). However, existing research

has inconclusive findings; some prove a positive impact of women on firm performance and some show the lack of this impact.

However, most of the research is conducted for a single country sample. Some researchers provide evidence that the association between the presence of women on board and firm performance might be moderated by the institutional environment (Grosvold *et al.*, 2007), and, in particular, a culture of gender equality (Post & Byron, 2015). Therefore, we wondered what was the impact of the women's presence on the board on firm performance when including companies from several countries (especially countries with similar backgrounds) in the sample.

We aimed to explore how women on management boards impact firm performance when taking into account companies coming from the Visegrad Group (V4) incorporating four post-communist countries from Central Europe: Poland, Hungary, the Czech Republic, and Slovakia. Specifically, we sought to determine whether the inclusion of women on management boards positively impacts company efficiency and certain aspects of market performance while considering various characteristics of board composition and the background of the V4 countries. Moreover, this research aims to contribute to the broader discourse on gender diversity in corporate leadership by providing empirical evidence on its potential influence on firm performance in the Central and Eastern European (CEE) context.

Our research sample consists of 451 and covers three years, *i.e.* 2019-2021. Since the role of the supervisory board is limited to supervising functions, our analysis focused on the gender composition of the management board. We expected to find a positive association between women's presence on the management board and firm performance reflected both by operating measures and market measures. To achieve our research aim and to verify research hypotheses, we implemented the two-sample *t*-test, the Mann-Whitney *U* test, and regression analysis. However, we documented only that there was a positive relation between the presence of women and operating performance. Furthermore, we showed that there was a specific type of company more prone to appoint women to the board. Such companies are bigger and older.

While acknowledging the extensive research on women in leadership positions and gender diversity, we went beyond existing literature to address a notable gap in several ways. It especially stands out by presenting a unique contribution by exploring the impact of women on corporate management boards in the V4 countries, aligning with impending regulatory changes, and adopting a distinctive approach by employing a comprehensive measurement methodology. These aspects collectively distinguish the research and offer new insights into the complex interplay between gender diversity and firm performance within a specific and hitherto underexplored regional context.

First and foremost, the investigation's concentration on the V4 countries, characterized by common historical backgrounds, societal expectations, and legal frameworks, underscores the significance of cultural and institutional factors in shaping gender diversity in corporate leadership. Furthermore, according to Human Development Report 2020, they are in the group of countries with very high Human Development Index. They have also a similar value to the Gender Development Index, which is used to measure gender inequalities. None of these countries has adopted gender mandatory quotas on management or supervisory boards for listed companies. However, Poland is the only country that uses 'soft law' (*i.e.* The Corporate Governance Code for Polish Listed Companies 2021) to encourage listed companies to implement diversity policy in management and supervisory boards, and especially to include women in these bodies. The V4 is the set of countries that are leaders in transition among CEE countries. The V4 countries have 64 million inhabitants, with Poland standing for more than half of them. The number of inhabitants in V4 is higher than in France (62 million), GB (61 million), or Spain (40 million) but lower than in Germany (82 million). Moreover, Poland and the Czech Republic have a high level of masculinity – *ca.* 60, Hungary and Slovakia – *ca.* 90, while West European countries: France and Germany – *ca.* 50, and Sweden – 5 (https://www.hofstede-insights.com). Thus, the study provides valuable insights into how context influences board compositions, with potential implications for understanding gender dynamics in similar settings. Moreover, most of the previous research focuses on West European or the U.S. economies. Within the European Union, diverse country conditions arise due to historical, social, or legal factors. Our analysis focuses on four post-communist economies that share similar traditions and values, with an aim to overcome the vicissitudes of history and challenge

stereotypes of women. The V4 is an informal group that in 1991 decided on closer cooperation due to their neighbourhood and some similarities (Valaskova *et al.*, 2022). These similarities refer to the fact that they made the transition from the communist system to their market economy at the same time. Acknowledging the V4 countries' leadership role in transitioning among CEE nations further enhances the study's contribution. By considering the unique position of these countries in post-communist economic development, the research provides insights into the dynamics of gender diversity within transitional economies. Finally, the regional focus on CEE, specifically the V4 countries, expands the geographic scope of existing literature. By examining gender diversity in a region with its own set of challenges, opportunities, and regulatory contexts, the study provides a unique contribution to the understanding of gender dynamics in corporate leadership.

Furthermore, the research underscores its policy relevance and timeliness by aligning with expected regulatory changes. The motivation to provide empirical arguments for the advantages of women's presence in leadership positions makes it a timely contribution, especially in the evolving landscape of EU regulatory frameworks. With this article, we contribute to the lively discussion about the role of women in leadership positions and gender quota law. European institutions have addressed a lot of actions to increase board diversity (see European Parliament, https://www.europarl.europa.eu/news/pl/press-room/20220603IPR32195/women-on-boards-deal-to-boost-gender-balance-in-companies). Thus, some EU countries (*e.g.* France, Germany, Italy, Belgium) decided to implement gender quota law for corporate boards of all public companies or companies of a certain size. Other countries took voluntary initiatives such as the adoption of corporate governance codes to increase female representation on the boards (*e.g.* Poland). There are also EU member states that have not implemented any tolls to achieve gender balance on boards (*e.g.* the Czech Republic, Slovakia, Hungary). Therefore, the Directive (EU) 2022/2381 of the European Parliament and of the Council of 23 November 2022 on improving the gender balance among directors of listed companies and related measures was adopted. It requires EU countries to introduce the gender quota law (40% of non-executive positions or 33% of all director positions should be held by underrepresented sex by 30 June 2026) before 28 December 2024. Motivated by anticipated regulatory changes, the research aligns itself proactively with shifts in board composition regulations. This not only shows the study is timely and relevant but also enables the provision of implications and recommendations for policymakers and practitioners preparing for such changes. The uniqueness of gender diversity initiatives within the V4 countries, exemplified by Poland's use of 'soft law' through The Corporate Governance Code for Polish Listed Companies 2021, adds a distinctive dimension to the study. This approach highlighted the practical aspects of encouraging diversity policies and offers context-specific insights that may apply to regions contemplating similar initiatives. Then, the focus on countries with a two-tier corporate governance system added a layer of complexity to the examination, particularly emphasizing the separation between management and supervisory boards. All these V4 countries have a two-tier corporate governance system. It is based on a clear organizational and functional separation of the management and the supervisory board (Velte, 2016). This organizational structure enhances the relevance of the study by providing a unique perspective on the influence of women on corporate management boards within this specific governance framework.

Moreover, this study employed a multifaceted analysis to investigate the impact of gender diversity on companies, going beyond a simplistic analysis, and enriching the overall findings. The incorporation of multiple measures for women's presence on boards, including the Blau index and the appointment of women as CEOs, contributes to a better understanding of the different dimensions of gender diversity on management boards. Furthermore, the article contributes through a comparative analysis of firm performance measures, considering both operating and market data. This dual perspective offers a more refined explanation of how gender diversity may impact various aspects of a company's performance. By adopting this comprehensive approach, the research offers a more holistic view compared to studies concentrating on specific aspects.

The rest of our article is organized as follows. The literature review section will present the main theories and research findings on gender diversity. The next section – methodology – will describe the

sampling process, variables definition, and the description of models implemented in hypothesis verification. The findings section includes our key results. The article will end with conclusions.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Recently, there has been an increasing trend in research on diversity on management boards. The basis of the diversity might be gender, age, educational background, or professional experience. Following the upper echelons theory, these demographic dimensions of managers affect the company's strategic choices, and finally – its outcomes (Hambrick & Mason, 1984). Other theories, that appeal to upper echelons theory, try to explain how demographic characteristics of group members contribute to the firm's behaviour and performance (Shauki & Oktavini, 2022).

There are several theories supporting the gender diversity of management boards regarding women: the agency theory (Jensen & Meckling, 1976; Fama & Jensen, 1983), the resource dependence theory (Pfeffer & Salancik, 1978), the human capital theory (Mincer, 1958; Schultz, 1961), the social capital theory (Coleman, 1988), the signalling hypothesis, the stewardship theory. However, some theories provide arguments against appointing a diversified board, these are the self-categorisation theory (Turner, 1985) and the social identity theory (Tajfel & Turner, 1979; 1986).

The agency theory shows several positive effects of women on board, *i.e.* voluntary disclosure of information such as profit forecast (Gyapong & Afrifa, 2019), quality of financial reporting (Pucheta-Martínez *et al.*, 2016), the accuracy of profit forecast (Qu *et al.,* 2015). These lead to a decrease in information asymmetry and problems in agency relations and better perception by shareholders. This is in line with the signalling hypothesis assuming that appointing women to the board will be a positive signal to shareholders (Certo, 2003; Miller & Del Carmen Triana, 2009). The resource dependence theory posits that female directors possess unique skills (different from male skills), that are provided to the board (Hillman *et al.*, 2002). Women have also a better understanding and feeling of the environment and clients. The human capital theory and social capital theory point to the role of human capital and social capital that are provided to the board. Since the educational background and the way to the management board of female directors is different than men's (Singh *et al.*, 2008; Dang & Vo, 2012), they contribute to the diversity of social and human capital that is available to the board. Following the stewardship theory (Davis *et al.*, 1997), women are more stewards than agents due to their skills and human capital. In line with this theory, women are more able to behave in favour of all stakeholders than shareholders only. Women are more able to balance the interests of different groups diminishing potential conflict situations.

However, some theories show negative aspects of gender diversity and appointing females to boards with only male directors. Theories supporting board homogeneity were developed on the grounds of social psychology and appeal to the similarity attraction paradigm. The rationale for hiring members on board who are similar in terms of demographic characteristics is that making decisions is more effective than in the case of a diversified board. Group members that differ in terms of gender, age, education, ethnicity or experience are likely to avoid cooperation and communication, which results in misunderstanding, conflicts, and finally, makes a decision process longer. Following this, higher group effectiveness is expected if its members are similar to each other. Thus, the inclusion of women on the male board will result in decreasing the board's effectiveness and the company's profitability.

Since theoretical conceptions on the role of board diversity and the role of women on board for firm performance provide different or opposite arguments, many researchers cope with this problem on the empirical ground. Research on women's impact on firm performance is very extensive but results are inconclusive.

Among the research proving a positive impact of women, there is research on Spanish public companies (Campbell & Mínguez-Vera, 2008; Reguera-Alvarado *et al.*, 2017; Valls Martínez & Cruz Rambaud, 2019). Although they implement different measures of women's presence on management boards (binary variable, percentage, Blau's Index, Shannon Index), they report a positive impact of women's presence on firm value (Q-Tobin). Similar conclusions were drawn for French companies (Sabatier, 2015; Dang *et al.*, 2018), Fortune1000 companies (Carter *et al.*, 2003; Erhardt *et*

al., 2003), European companies (Isidro & Sobral, 2015), UK companies (Brahma *et al.,* 2021), and Indian companies (Duppati *et al.*, 2020).

However, it seems that the way scholars measure firm performance matters for the findings. There is research showing a negative relationship between gender board diversity and return on equity (Mínguez-Vera & Martin, 2011). This negative influence was explained by women's impact on more conservative strategies resulting in lower profitability.

There is also research with mixed findings, *e.g.* Bennouri *et al.* (2018) found that for French companies there is a positive relation between women's presence on the management board and return on equity (ROE) and return on assets (ROA) and negative between women's presence on board and firm value (Q-Tobin). Vafaei *et al.* (2015) found that for Australian companies there is a positive impact of women's presence and both ROA, ROE, operating cash flow, and Q-Tobin. In line with these findings, the research of Terjesen *et al.* (2016) for companies from 49 countries showed a positive relation between women's presence on board and firm performance.

One can also find research showing the lack of impact of women on firm performance, *e.g.* Marinova *et al.* (2016) for Dutch and Danish companies, Rose *et al.* (2013) for Nordic and German companies, Rose (2007) for Dutch companies, Randøy *et al.* (2006) for Scandinavian companies, Kagzi and Guha (2018) for Indian companies, and Marquez-Cardenas *et al.* (2022) for Latin America companies. Loy and Rupertus (2022) report that gender diversity does not impact any effect on long-term stock performance for the firms included in Thomson Reuters' Asset4 database.

Since the association between gender diversity on the board and firm performance has been extensively studied, some investigations apply the meta-analysis to show the results of multiple scientific studies. Post and Byron (2015) analysed 144 research articles and stated that the presence of female directors on boards is positively associated with accounting measures of financial performance. However, if financial performance is reflected by market measures, such a relationship is not statistically significant. They report that a positive correlation is stronger in countries with stronger protection of shareholders and with higher gender parity score (Post & Byron, 2015). The results of the meta-analysis conducted by Hoobler *et al.* (2018) show that the relationship between women's presence on the board and firm performance is not conclusive, however, gender board diversity might contribute to firm performance, and especially sales performance. They emphasize that the positive role of female directors might be stronger in the case of gender egalitarian culture.

In turn, the meta-analysis of Pletzer *et al.* (2015) including data from 20 research papers (34 models) shows that the inclusion of women on boards is positively related to the firm's efficiency, however, this association is not statistically significant. On the one hand, there are no economic arguments for diversity, but, on the other hand, there are no arguments against women's appointment to the boards (Pletzer *et al.,* 2015). Nonetheless, the ethical arguments for the inclusion of female directors are still valid. Thus, apart from business arguments for women's appointment to the boards, there are also ethical arguments – no one can be excluded from the team because of gender, age, etc.

Although the relationship between board gender diversity and firm performance is examined by many researchers, studies including companies from Central and Eastern European countries are very limited. For example, the research for Czech travel agencies and tour operators for the period 2008-2015 reveals that women's presence in executive bodies has no statistically significant relationship with both firm performance (*i.e.* ROE and return on sales – ROS) and the companies' financial health (Hedija & Němec, 2021). Moreover, previous research including Czech stock companies from the IT industry shows that the percentage of women in management and supervisory boards does not affect firm performance measured as ROA and ROS (Janošová & Mikuš, 2018). There has been also research on women in Poland, conducted by Bohdanowicz (2011), who found a positive relation between ROA, ROE, and Blau's Index. While Kompa and Witkowska (2017) found no significant or negative relations between women's presence and profitability.

One reason for the inconclusive findings might be the way firm performance is measured. There are two attitudes toward firm performance measurement. One way of measuring firm performance is focused on operational firm performance and based on accounting data. The other way is focused on market firm performance and based on share prices. Operating firm performance relies on past and

solid evidence recorded in the accounting books. Market firm performance relies on shareholders' expectations and subjective shareholders' perceptions, which are based not only on the company's past financial results but also on the expected future value (Loy & Rupertus, 2022). Shareholders' perceptions and expectations might be explained by the institutional theory (DiMaggio & Powell, 1983). Institutional theory posits that organizations are influenced and shaped by the prevailing norms, regulations, and cultural expectations of their institutional environment (Azfali *et al.*, 2021), which may include shareholders' expectations. Consequently, firms operating in a similar environment are likely to conform to established practices and expectations, including those related to gender diversity (Allemand *et al.*, 2014). Therefore, this study analyses how these organizations respond to pressures for gender diversity on management boards. In this study, the institutional environment encompasses the sociocultural context, regulatory framework, and gender equality norms within the V4 countries.

The above considerations allow us to ask the research questions: can the presence of women on corporate boards influence the performance of a company? Does it matter more for operating or for market firm performance? So, we formulate the following research hypotheses:

H1: Firms having women on their management boards exhibit higher operating efficiency.

H2: Firms having women on their management boards exhibit higher market performance.

The justification for our hypotheses might be the fact that for many years European institutions have addressed a lot of actions to increase board diversity, and right now we might expect positive results from this policy.

RESEARCH METHODOLOGY

We based our sample on publicly traded companies at the end of 2021 within every stock exchange situated in the V4 countries. The four markets represented in the study are the following: the Warsaw Stock Exchange, the Prague Stock Exchange, the Budapest Stock Exchange, and the Bratislava Stock Exchange. The study examines data from 2019 to 2021 for a total of 451 companies. Table 1 characterizes the composition of the study sample.

Our research sample consisted of 451 companies from V4 countries, however, most of our sample were Polish companies. Since the Polish capital market is the biggest one in Central Europe, Polish companies represented 83.37% of the sample. The companies belonged to 11 industries, but the most numerous sector was industrials. On average, the age of research companies was 17.9 years. The financial data showed that the analysed companies were very diversified. The standard deviation for financial data was very high. Thus, the difference between their mean and median values was also very high.

We employed four primary types of characteristics to describe the composition of the management board from the perspective of gender diversity. To investigate the presence of women on board, we used the binary variable W_YES_MB which equals 1 if at least one woman is present on the management board, and 0 otherwise. To check the share of female directors in the composition of the board, we used the variable W_PER_MB which was the ratio of the number of female directors to all directors on the board of the firm. Then, to examine not only the percentage of female directors but also the level of gender diversity in the management board, we included also BLAU_MB which is Blau's Index of heterogeneity. It is calculated as $1 - \sum_{i=1}^{n} p_i^2$ where p_i is the percentage of each category and n = 2 (men and women). The lower value it takes the more homogeneous in terms of gender the individuals are (Solanas *et al.*, 2012). Finally, last but not least, we checked who holds the role of CEO by introducing the binary variable CEO_YES which equals 1 if a woman held the CEO position and otherwise 0.

Since our study involved assessing the influence of female managers on company efficiency and market performance, in the first stage, we checked whether there were any statistically significant differences between firms including women on the management board. For this purpose, we used the two-sample *t*-test and the Mann-Whitney *U* test. Then, for further investigation, we employed data regression using ordinary least squared. Specifically, we examined the following equation:

$$\text{Performance}_{i,t} = \beta_0 + \beta_1 \begin{bmatrix} \text{W\_YES\_MB} \\ \text{W\_PER\_MB} \\ \text{BLAU\_MB} \\ \text{CEO\_YES} \end{bmatrix}_{i,t} + \beta_2 \ ln(\text{ASSETS})_{i,t} + \beta_3 \ ln(\text{AGE})_{i,t} + \\ + \beta_4 \ \text{DEBT RATIO}_{i,t} + \beta_5 \ \text{INDUSTRY}_{i,t} + \beta_6 \ \text{COUNTRY}_{i,t} + \varepsilon_{i,t} \quad (1)$$

Table 1. Sample characteristics

Cross-country distribution					
Country	**Number of Companies**		**Percentage**		
The Czech Republic	11		2.44		
Hungary	39		8.65		
Poland	376		83.37		
Slovakia	25		5.54		
Total	451		100.00		
Cross-industry distribution					
Industry	**Number of Companies**	**Percentage**	**Industry**	**Number of Companies**	**Percentage**
Utilities	16	3.55	Real Estate	36	7.98
Telecommunications	10	2.22	Industrials	106	23.50
Consumer Staples	32	7.10	Energy	8	1.77
Health Care	27	5.99	Financials	67	14.86
Consumer Discretionary	71	15.74	Technology	44	9.76
			Basic Materials	34	7.54
			Total	451	100.00
Sample characteristics at the end of the 2021 fiscal year					
Specification		**Mean**	**Std. Dev.**	**Median**	**N**
Age	in years	17.90	7.73	19.19	451
Market Capitalization	million EUR	24 903.89	254 345.01	200.40	445
Total Revenue	million EUR	532.77	2 187.27	44.96	376
Net Income After Taxes	million EUR	52.31	221.31	3.55	392
Total Assets	million EUR	2 330.52	9 969.76	72.77	391

Source: own study.

The explanatory variable is the company performance characteristics measured by ROE (net income to equity), ROA (net income to total assets), OPR (operating profit margin, which is a measurement of management's efficiency calculated as operating income divided by total revenue), market to book value (MV/BV), and 52-week total return, respectively. Next, to mitigate multicollinearity among the management board variables, we split our analysis into four separate models depending on the women's presence measure (W_YES_MB, W_PER_MB, BLAU_MB, CEO_YES respectively). Furthermore, all the models incorporated control variables to account for the effect of size (the natural log of total assets) and age (the natural log of the number of years since incorporation), capital structure (debt ratio), type of business (industry dummies) and location (country dummies). To mitigate the influence of outliers, we winsorized all continuous variables in the 5%-95% range.

The quantitative methods used in the study are commonly used and provide valuable insights into the relationship between female directors, company efficiency, and market performance. While this approach offers statistical evidence, it is essential to be mindful of its limitations, such as the challenge of establishing causation. Moreover, the focus on quantitative metrics may overlook qualitative factors that also influence board dynamics and organizational culture. Moreover, taking into account the territorial limitation of the sample, our findings may be specific to the V4 countries and may not necessarily apply to other regions with different cultural, regulatory, and economic contexts.

As we have not found any comprehensive database providing governance data of stock companies in the V4 countries, the individual characteristics of the management board of each company are hand-collected and checked using Internet searches. To ensure the numbers are comparable across four countries and all industries, the market and financial data are retrieved from the Refinitiv Eikon database.

RESULTS AND DISCUSSION

Table 2 provides some insight into women's representation on management boards in the research sample.

Table 2. Characteristics of management boards of listed companies in the V4 countries

Specification	Mean	Std. Dev.	Q1	Median	Q3	N
Whole Sample						
W_YES_MB	0.3281	0.4701	0.0000	0.0000	0.0000	448
W_PER_MB	0.1199	0.2003	0.0000	0.0000	0.0000	448
BLAU_MB	0.1309	0.1977	0.0000	0.0000	0.0000	448
CEO_YES	0.0469	0.2116	0.0000	0.0000	0.0000	448
The Czech Republic						
W_YES_MB	0.6364	0.5045	0.0000	1.0000	1.0000	11
W_PER_MB	0.1684	0.1980	0.0000	0.1429	0.2000	11
BLAU_MB	0.2088	0.1782	0.0000	0.2449	0.3200	11
CEO_YES	0.0909	0.3015	0.0000	0.0000	0.0000	11
Hungary						
W_YES_MB	0.5000	0.5067	0.0000	0.5000	1.0000	38
W_PER_MB	0.1510	0.1857	0.0000	0.0455	0.2000	38
BLAU_MB	0.1892	0.2038	0.0000	0.0826	0.3200	38
CEO_YES	0.0526	0.2263	0.0000	0.0000	0.0000	38
Poland						
W_YES_MB	0.2914	0.4550	0.0000	0.0000	1.0000	374
W_PER_MB	0.1091	0.1947	0.0000	0.0000	0.2000	374
BLAU_MB	0.1188	0.1944	0.0000	0.0000	0.3200	374
CEO_YES	0.0348	0.1834	0.0000	0.0000	0.0000	374
Slovakia						
W_YES_MB	0.4800	0.5099	0.0000	0.0000	1.0000	25
W_PER_MB	0.2124	0.2746	0.0000	0.0000	0.3333	25
BLAU_MB	0.1898	0.2224	0.0000	0.0000	0.4444	25
CEO_YES	0.2000	0.4082	0.0000	0.0000	0.0000	25

Source: own study.

Female representation on management boards was very low in our sample. Only 32.8% of companies appointed at least one woman to the management board, which means that management boards in most of the companies (67.2%) were composed of only male directors. The average share of women on the management board was very low – at the level of 12%.

The mean value of BLAU_MB amounted to 0.131 and was much lower than its maximum value of 0.5 (the highest possible level). It seems that companies are not likely to appoint women to CEO positions – only 4.7% of companies hired a female director as CEO. However, the high values of standard deviation for our variables give evidence that our research sample is strongly diversified in terms of women's presence on the management boards.

Some differences are also observed in the composition of the management board between countries. Although only Poland implemented 'soft law' referring to the presence of women on the board, the data show that the presence of women on management boards of Polish companies was

the lowest. However, the explanation of this finding might lie in the fact that Polish companies constitute the most numerous group in the sample.

The low women's participation in management boards might be connected with specific national cultures of Central and Eastern European countries. Poland and the Czech Republic have a high level of masculinity – *ca.* 60, Hungary and Slovakia – *ca.* 90, while West European countries: France and Germany – *ca.* 50, and Sweden – 5 (https://www.hofstede-insights.com).

Next, we divided our research sample into two groups. The first group includes companies with at least one woman on the management board (Panel A), and the other one – without any women on the management board (Panel B). Table 3 shows descriptive statistics for the firm performance and company characteristics for both groups of companies and the results of parametric and non-parametric tests for these variables.

Table 3. Company characteristics and firm performance

Characteristics	Mean	Std. Dev.	Median	n
Panel A. At least one woman on the management board				
Firm performance				
ROE [%]	13.15	35.63	11.18	107
ROA [%]	5.41	14.32	4.57	123
OPR [%]	-1 101.83	12 367.20	10.56	124
MV/BV	75.15	243.84	6.27	124
52-week total return	29.25	53.29	20.16	138
Company characteristics				
Company market capitalization	46 679.39	390 034.31	626.50	144
Age	18.92	8.05	20.32	147
Total revenue	1 053.44	3 495.46	89.37	112
Net income before extraordinary items	117.06	321.19	7.46	124
Net income after taxes	123.46	333.09	6.80	123
Total assets	5 760.75	16 448.87	179.98	124
Total debt	895.51	5 670.79	35.75	124
Cash from operating activities	239.48	885.81	7.97	122
Cash from investing activities	-123.58	561.55	-3.31	121
Cash from financing activities	-35.31	412.54	-2.42	120
Panel B. No women on the management board				
Firm performance				
ROE [%]	1.82	57.65	10.25	241
ROA [%]	53.14	849.81	4.46	265
OPR [%]	-396.75	6 192.27	6.03	261
MV/BV	200.24	2 500.86	5.00	265
52-week total return	144.26	1 687.04	20.48	289
Company characteristics				
Company market capitalization	14 596.55	152 061.72	127.76	298
Age	17.43	7.57	18.38	301
Total revenue	314.25	1 229.27	39.19	262
Net income before extraordinary items	19.35	129.97	2.03	267
Net income after taxes	19.98	133.00	2.06	267
Total assets	742.95	3 560.75	49.93	265
Total debt	104.83	407.48	6.20	265
Cash from operating activities	57.92	258.44	1.67	265
Cash from investing activities	-28.37	121.84	-0.79	264
Cash from financing activities	-12.32	103.76	-0.71	262

Panel C. Statistical significance of differences between Panel A and Panel B				
Specification	***t*-statistics**	***p*-value**	***U* Mann Whitney Statistics**	***p*-value**
Firm performance				
ROE [%]	1.8795	0.0610	0.9030	0.3665
ROA [%]	-0.6225	0.5340	0.7034	0.4818
OPR [%]	-0.7457	0.4563	3.2289	0.0012
MV/BV	-0.5554	0.5790	1.8545	0.0637
52-Week total return	-0.8002	0.4240	0.3819	0.7025
Company characteristics				
Company market capitalization	1.2395	0.2158	4.6832	0.0000
Age	1.9171	0.0559	2.2111	0.0270
Total revenue	3.0183	0.0027	3.4633	0.0005
Net income before extraordinary items	4.2782	0.0000	4.1439	0.0000
Net income after taxes	4.3792	0.0000	4.0863	0.0000
Total assets	4.7405	0.0000	5.0860	0.0000
Total debt	2.2606	0.0243	5.1001	0.0000
Cash from operating activities	3.0688	0.0023	4.6845	0.0000
Cash from investing activities	-2.6271	0.0090	-4.4240	0.0000
Cash from financing activities	-0.8465	0.3978	-1.6157	0.1062

Note: unwinsorized data.
Source: own study.

The data show that companies that appointed at least one woman to the board differ quite significantly. These companies have higher capitalization, are older, have higher revenues, higher profit, total assets, and debt. All of these differences have statistical significance. This means that there is a specific picture of the company that appoints women to the board. However, in terms of firm performance (both market and operational), there were fewer differences. The differences are noticeable in the median for OPR and MV/BV ratios. Companies with women on management boards have slightly higher OPR and MV/BV ratios. We might conclude that there are strong specific characteristics of a company that decides to appoint women to the board, while the presence of women on the board does not result in spectacular financial success (operating or market).

These findings lead us to our central question of whether the presence of woman directors on management boards could impact firm performance. Following the results of parametric and non-parametric tests, we employed two dependent variables as a measure of efficiency: OPR and MV/BV ratios. By applying both operating and market measures, we analysed the role of female directors from the perspective of accounting books and shareholders' perception.

Table 4 documents the results of a regression analysis with OPR as a dependent variable.

The results show that two variables referring to women's presence on the management board positively related to operating efficiency (OPR). We might conclude that there was a higher OPR if the percentage of women on the management board (W_PER_MB) is higher. Thus, we confirmed our first hypothesis (assuming that firms having women on the management board exhibit higher operating performance). We observed a similar effect if the management board was more diversified in terms of gender (BLAU_MB). However, taking the position of CEO by a woman (CEO_YES) or having at least one woman on the management board (W_YES_MB) does not affect performance.

Regarding control variables, the results show that company size (in assets) is positively related to OPR. It confirms the economics of scale that occurs in larger companies. This result is consistent with previous studies (Dang *et al.*, 2018; Duppati *et al.*, 2020).

Table 5 presents the result of a regression analysis with the MV/BV ratio as the dependent variable.

Table 4. Regression analysis of the impact of women on board on the OPR ratio

Variable	OPR	OPR	OPR	OPR
Intercept	-70.82*** (-5.2502)	-73.25*** (-5.4556)	-71.66*** (-5.3311)	-72.57*** (-5.3957)
W_YES_MB	3.77 (1.4933)	–	–	–
W_PER_MB	–	**12.70** ** **(2.1993)**	–	–
BLAU_MB	–	–	**10.62** * **(1.7987)**	–
CEO_YES	–	–	–	-1.43 (-0.2457)
LN_ASSETS	5.01*** (7.6769)	5.16*** (8.1034)	5.03*** (7.8064)	5.22*** (8.1790)
LN_AGE	-1.04 (-0.3673)	-1.23 (-0.4339)	-0.94 (-0.3344)	-0.98 (-0.3463)
DEBT RATIO	-7.37 (-1.0424)	-7.74 (-1.0970)	-7.80 (-1.1039)	-7.62 (-1.0751)
Industry sector	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes
Adj. R-squared	0.1562	0.1581	0.1569	0.1546
F-statistic	14.0015	14.1855	14.0724	13.8483
Prob(F-statistic)	0.0000	0.0000	0.0000	0.0000
Total observations	1195	1195	1195	1195

Note: ***, **, and * denote significance levels of 1%, 5%, and 10%, respectively.
Source: own study.

Table 5. Regression analysis of the impact of women on board on the MV/BV ratio

Variable	MV/BV	MV/BV	MV/BV	MV/BV
Intercept	337.27*** (24.7014)	335.82*** (24.7164)	335.86*** (24.6806)	335.83*** (24.7314)
W_YES_MB	2.88 (1.1038)	–	–	–
W_PER_MB	–	-4.64 (-0.2697)	–	–
BLAU_MB	–	–	1.11 (0.1822)	–
CEO_YES	–	–	–	8.34 (1.3812)
LN_ASSETS	-1.34** (-2.0246)	-1.15* (-1.7751)	-1.20* (-1.8238)	-1.21* (-1.8740)
LN_AGE	-6.40** (-2.2292)	-6.38** (-2.2214)	-6.41** (-2.2326)	-6.75** (-2.3458)
DEBT RATIO	1.45 (0.2025)	1.44 (0.2003)	1.33 (0.1848)	2.04 (0.2842)
Industry sector	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes
Adj R-squared	0.7805	0.7834	0.7803	0.7806
F-statistic	256.7872	256.6206	256.4654	256.97
Prob(F-statistic)	0.0000	0.0000	0.0000	0.0000
Total observations	1224	1224	1224	1224

Note: ***, **, and * denote significance levels of 1%, 5%, and 10%, respectively.
Source: own study.

Taking the perspective of investors, we did not find any statistically significant association between women's presence on the management board and MV/BV ratio. Thus, our findings did not support our second hypothesis (assuming that firms having women on the management board exhibit higher market performance). The control variables the company size (LN_ASSETS) and its age (LN_AGE) related negatively to MV/BV ratio. It suggests that older and larger companies have lower growth opportunities (*i.e.* lower MV/BV ratio) than their younger and smaller counterparts.

Our results showing a positive impact of management board diversity on performance measured as operating profit margin allowed us to confirm our research hypothesis assuming that the inclusion of women on the management board impacts positively company's performance.

The analysis showed that, as in other geographic areas, there was a significant gender gap in the composition of corporate boards. For the 500 biggest Australian companies in 2011, Vafaei *et al.* (2015) found that 12.3% was the average share of women on board. Sabatier (2015) found that for the French largest listed companies included in the CAC40 index companies, the fraction of female directors was 16% on average in 2012, and the percentage of female directors on boards increased to nearly 27% in 2012. Moreover, Singh *et al.* (2015) reported that the presence of women on the board in French companies in 2012 was 12.7%. Noteworthy, our results for the V4 countries were noted for 2021, while similar results in other Western and developed countries were achieved several years before.

Our findings on the positive impact of women on operating firm performance are in line with previous research by Liu *et al.* (2014). They prove the positive relationship between performance measured as return on sales and board gender diversity document for Chinese listed firms. Isidro and Sobral (2015) who investigated companies from 16 European countries and Kılıç and Kuzey (2016) for Turkish companies also found a positive impact. A positive impact on firm performance proves that women have specific skills that positively affect company running. In this way, our findings provide evidence supporting resource dependence theory.

Our results on the lack of the impact of women on the management board on the market firm performance confirm the results of Loy and Rupertus (2022). They report the lack of association between women's presence and long-term stock performance. This might imply that investors do not expect and thus do not appreciate companies appointing women to the board. Thus, appointing women to the board is not a signal (nor positive or negative). In this way, our findings do not provide evidence supporting the signalling theory.

CONCLUSIONS

The main aim of our research was to find whether the presence of women on the management boards affects the firm performance in stock companies from the V4 countries.

Firstly, we found that only 33% of companies had women on board, women constituted only 12% of board members, and less than 5% of the companies had a female CEO. This low level of women's presence on board is the same as Western and developed countries achieved several years ago. This low level of women's presence on board might be explained by the national cultures of the countries constituting the V4 group, and especially their high masculinity score.

Secondly, we also found that there was a specific type of company that appoints women to the board. These companies are bigger and older. This might imply that these companies are more mature and established and are looking to diversify their management methods by meeting the requirements of society development (not only the clients).

Our findings show a positive and statistically significant impact of women on management boards on operating profit margins. We might conclude that women's presence on management boards is important for the business running and firm operating performance. However, it is not enough to appoint one woman to the board or to the CEO position as these variables (W_YES_MB and CEO_YES) are of no importance. But the more women on the board (W_PER_MB and BLAU_MB), the higher the operating firm performance. More women on the management board makes them feel more confident and active.

However, we found no impact of women on management boards on market performance. Thus, we might conclude that women's presence on management boards is not particularly important for investors. It might suggest that they are not aware of the women's role in leadership positions or regulatory changes that are to take place.

We found economic arguments supporting women's appointment to the boards. However, apart from economic arguments on women's appointment to the boards, there were also ethical arguments for the inclusion of female directors – no one can be excluded from a team because of gender, age, etc. We believe that these ethical arguments are valid for the V4 countries, especially since there are positive economic consequences of including women in decision-making. Our findings show that the more women on the board the higher operating performance. Companies should encourage women to play active roles in the companies. It is not enough to appoint more women to the board. Companies should also consider women's skills and competencies. Companies are advised to introduce motivational programs for women and create a culture of women's inclusion. We believe that our results might provide arguments for gender diversity in leadership positions. This issue seems to be important since EU countries will have to introduce the gender quota regulation for large publicly traded firms before 28 December 2024. Gender equality, and especially gender equality in decision-making positions is one of the goals included in the 2030 Agenda for Sustainable Development. We believe it might influence the awareness of gender diversity. Our research shows that although the inclusion of female directors on boards positively impacts operating performance, the lack of association between market firm performance and women's presence on management boards might suggest that female presence is not important for investors. Thus, more initiatives promoting the advantages of gender diversity are recommended.

Our research is not limitations free. Firstly, it includes only listed companies. We expect that the inclusion of private companies, especially family firms might provide some interesting findings. Secondly, our analysis is limited to four countries with similar historical, social, and economic contexts. Thirdly, we included in our analysis only quantitative variables.

The above limitations indicate directions for future research. Expanding the sample to companies from a bigger number of countries that differ to a greater extent than V4 countries might provide new evidence. Furthermore, a more thorough examination of the cultural and institutional factors at play within each country could be undertaken to illuminate the specific drivers and barriers shaping gender diversity on management boards. Further investigations may also extend to analyzing the impact of other forms of diversity, like age, ethnicity, and educational background, on firm performance, and delve into the implications of gender diversity on various performance dimensions such as innovation, corporate social responsibility, or sustainability. The inclusion of other variables, especially those referring to corporate governance or of qualitative nature might provide some interesting insights into the investigation of the role of female directors. Moreover, exploring mediation analysis with women on management boards as a mediator for firm performance could provide valuable insights into the underlying mechanisms.

REFERENCES

Afzali, M., Silvola, H., & Terjesen, S. (2021). Social Capital and board gender diversity. *Corporate Governance: An International Review, 30*(4), 461-481. https://doi.org/10.1111/corg.12418

Allemand, I., Barbe, O., & Brullebaut, B. (2014). Institutional theory and gender diversity on European boards. *Vie & Sciences de l'Entreprise, 198*(2), 73-92. https://doi.org/10.3917/vse.198.0073

Bennouri, M., Chtioui, T., Nagati, H., & Nekhili, M. (2018). Female board directorship and firm performance: What really matters?. *Journal of Banking and Finance, 88*, 267-291. https://doi.org/10.1016/j.jbankfin.2017.12.010

Bohdanowicz, L. (2011). Zróżnicowanie organów statutowych pod względem płci a wyniki finansowe polskich spółek publicznych. *Acta Universitatis Nicolai Copernici, Ekonomia*, *42*(1), 105-117. https://doi.org/10.12775/AUNC_ECON.2011.008

Brahma, S., Nwafor, C., & Boateng, A. (2021). Board gender diversity and firm performance: The UK evidence. *International Journal of Finance and Economics, 26*, 5704-5719. 1-16. https://doi.org/10.1002/ijfe.2089

Campbell, K., & Mínguez-Vera, A. (2008). Gender diversity in the boardroom and firm financial performance. *Journal of Business Ethics, 83*(3), 435-451. https://doi.org/10.1007/s10551-007-9630-y

Carter, D.A., Simkins, B.J., & Simpson, W.G. (2003). Corporate Governance, Board Diversity, and Firm Value. *Financial Review*, *38*, 33-53. https://doi.org/10.1111/1540-6288.00034

Certo, S.T. (2003). Influencing Initial Public Offering Investors with Prestige: Signaling with Board Structures. *The Academy of Management Review, 28*(3), 432-446. https://doi.org/10.2307/30040731

Coleman, J.S. (1988), Social Capital in the Creation of Human Capital. *American Journal of Sociology, 94*, 95-120.

Dang A.R., Houanti, L., Ammari, A., & Lê, N.T. (2018). Is there a 'business case' for board gender diversity within French listed SMEs. *Applied Economics Letters, 25*(14), 980-983. https://doi.org/10.1080/13504851.2017.1390308

Dang, R., & Vo, L.C. (2012). Women on Corporate Boards of Directors: Theories, Facts and Analysis. In S. Boubaker & D.K. Nguyen (Eds.), *Board Directors and Corporate Social Responsibility* (pp. 30-21). London: Palgrave Macmillan.

Davis, J.H., Schoorman, F.D., & Donaldson, L. (1997). Toward a Stewardship Theory of Management. *The Academy of Management Review, 22*(1), 20-47. https://doi.org/10.2307/259223

DiMaggio, P.J., & Powell, W.W. (1983). The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields. *American Sociological Review, 48*(2), 147-160.

Directive (EU) 2022/2381 of the European Parliament and of the Council of 23 November 2022 on improving the gender balance among directors of listed companies and related measures. Text with EEA relevance, (Official Journal of the European Union, L 315/44, 7.12.2022).

Duppati, G., Rao, N.V., Matlani, N., Scrimgeour, F., & Patnaik, D. (2020). Gender diversity and firm performance: evidence from India and Singapore. *Applied Economics, 52*(14), 1553-1565. https://doi.org/10.1080/00036846.2019.1676872

Erhardt, N., Werbel, J., & Shrader, C. (2003). Board of Director Diversity and Firm Financial Performance. *Corporate Governance: An International Review, 11*, 102-111. https://doi.org/10.1111/1467-8683.00011

Fama, E., & Jensen, M. (1983). Agency Problems and Residual Claims. *The Journal of Law & Economics, 26*(2), 327-349.

Grosvold, J., Brammer, S., & Rayton, B. (2007). Board diversity in the United Kingdom and Norway: an exploratory analysis. *Business Ethics: A European Review, 16*(4), 344-357. https://doi.org/10.1111/j.1467-8608.2007.00508.x

Gyapong, E., & Afrifa, G.A. (2019). The simultaneous disclosure of shareholder and stakeholder corporate governance practices and their antecedents. *International Journal of Finance and Economics, 24*(1), 260-287. https://doi.org/10.1002/ijfe.1661

Hambrick, D.C., & Mason, P.A. (1984). Upper Echelons: The Organization as a Reflection of Its Top Managers. *The Academy of Management Review*, *9*(2), 193-206.

Hedija, V., & Němec, D. (2021). Gender diversity in leadership and firm performance: Evidence from the Czech Republic. *Journal of Business Economics and Management, 22*(1), 156-180. https://doi.org/10.3846/jbem.2020.1368

Hillman, A.J., Canella, A.A., & Harris, I.C. (2002). Women and racial minorities in the boardroom: How do directors differ? *Journal of Management, 28*(6), 747-763. https://doi.org/10.1016/S0149-2063(02)00192-7

Hoobler, J.M., Masterson, C.R., Nkomo, S.M., & Michel, E.J. (2018). The Business Case for Women Leaders: Meta-Analysis, Research Critique, and Path Forward. *Journal of Management, 44*(6), 2473-2499. https://doi.org/10.1177/0149206316628643

Isidro, H., & Sobral, M. (2015). The Effects of Women on Corporate Boards on Firm Value, Financial Performance, and Ethical and Social Compliance. *Journal of Business Ethics, 132*(1), 1-19. https://doi.org/10.1007/s10551-014-2302-9

Janošová, L., & Mikuš, P.A. (2018). Relationship between gender and age diversity among board members and firm performance. In J. Nesleha, F. Hampl, & M. Svoboda (Eds.), *15th International Scientific Conference on European Financial Systems 2018* (pp. 202-209). Brno: Masaryk University.

Jensen, M.C., & Meckling, W.H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, *3*(4), 305-360.

Kagzi, M., & Guha, M. (2018). Does board demographic diversity influence firm performance? Evidence from Indian-knowledge intensive firms. *Benchmarking: An International Journal, 25*(3), 1028-1058. https://doi.org/10.1108/BIJ-07-2017-0203

Kılıç, M., & Kuzey, C. (2016). The effect of board gender diversity on firm performance: evidence from Turkey. *Gender in Management: An International Journal*, *31*(7), 434-455. https://doi.org/10.1108/GM-10-2015-0088

Kompa, K., & Witkowska, D. (2017). Czy obecność kobiet w kierownictwie wpływa na rentowność kapitału własnego spółek notowanych na GPW?. *Zarządzanie i Finanse*, *15*(3), 5-20.

Liu, Y., Wei, Z., & Xie, F. (2014). Do women directors improve firm performance in China?. *Journal of Corporate Finance*, *28*, 169-184. https://doi.org/10.1016/j.jcorpfin.2013.11.016

Loy, T.R., & Rupertus, H. (2022). How Does the Stock Market Value Female Directors?. *International Evidence. Business and Society, 61*(1), 117-154. https://doi.org/10.1177/0007650320949839

Marinova, J., Plantenga, J., & Remery, C. (2016). Gender diversity and firm performance: evidence from Dutch and Danish *boardrooms. International Journal of Human Resource Management, 27*(15), 1777-1790. https://doi.org/10.1080/09585192.2015.1079229

Marquez-Cardenas, V., Gonzalez-Ruiz, J.D., & Duque-Grisales, E. (2022). Board gender diversity and firm performance: evidence from Latin America. *Journal of Sustainable Finance and Investment, 12*(3), 785-808. https://doi.org/10.1080/20430795.2021.2017256

Miller, T., & Del Carmen Triana, M. (2009). Demographic diversity in the boardroom: Mediators of the board diversity-firm performance relationship. *Journal of Management Studies, 46*(5), 755-786. https://doi.org/10.1111/j.1467-6486.2009.00839.x

Mincer, J. (1958). Investment in Human Capital and Personal Income Distribution. *Journal of Political Economy*, *66*(4), 281-302.

Mínguez-Vera, A., & Martin, A. (2011). Gender and management on Spanish SMEs: An empirical analysis. *International Journal of Human Resource Management, 22*(14), 2852-2873. https://doi.org/10.1080/09585192.2011.599948

Pfeffer, J., & Salancik, G. (1978). *The External Control of Organizations: A Resource Dependence Perspective*. New York: Harper & Row.

Pletzer, J.L., Nikolova, R., Kedzior, K.K., & Voelpel, S.C. (2015). Does gender matter? Female representation on corporate boards and firm financial performance - A meta-analysis*. PLoS ONE, 10*(6), 1-20. https://doi.org/10.1371/journal.pone.0130005

Post, C., & Byron, K. (2015). Women on boards and firm financial performance: A meta-analysis. *Academy of Management Journal, 58*(5), 1546-1571. https://doi.org/10.5465/amj.2013.0319

Pucheta-Martínez, M.C., Bel-Oms, I., & Olcina-Sempere, G. (2016). Corporate governance, female directors and quality of financial information. *Business Ethics, 25*(4), 363-385. https://doi.org/10.1111/beer.12123

Qu, W., Ee, M.S., Liu, L., Wise, V., & Carey, P. (2015). Corporate governance and quality of forward-looking information Evidence from the Chinese stock market. *Asian Review of Accounting, 23*(1), 39-67. https://doi.org/10.1108/ARA-03-2014-0029

Randøy, T., Thomsen, S., & Oxelheim, L. (2006). A Nordic perspective on corporate board diver. Paper Presented at European International Business Academy Annual Conference, Fribourg.

Reguera-Alvarado, N., de Fuentes, P., & Laffarga, J. (2017). Does Board Gender Diversity Influence Financial Performance? Evidence from Spain. *Journal of Business Ethics, 141*(2), 337-350. https://doi.org/10.1007/s10551-015-2735-9

Rose, C. (2007). Does female board representation influence firm performance? The Danish evidence. *Corporate Governance: An International Review, 15*(2), 404-413. https://doi.org/10.1111/j.1467-8683.2007.00570.x

Rose, C., Munch-Madsen, P., & Funch, M. (2013). Does board diversity really matter? Gender does not, but citizenship does. *International Journal of Business Science and Applied Management, 8*(1), 15-27.

Sabatier, M. (2015). A women's boom in the boardroom: effects on performance?. *Applied Economics*, *47*(26), 2717-2727. https://doi.org/10.1080/00036846.2015.1008774

Schultz, T.W. (1961). Investment in Human Capital. *The American Economic Review*, *51*(5), 1035-1039.

Shauki, E.R., & Oktavini, E. (2022). Earnings Management and Annual Report Readability: The Moderating Effect of Female Directors. *International Journal of Financial Studies, 10*(73), https://doi.org/10.3390/ijfs10030073

Singh, V., Point, S., Moulin, Y., & Davila, A. (2015). Legitimacy profiles of women directors on top French company boards. *Journal of Management Development, 34*(7), 803-820. https://doi.org/10.1108/JMD-10-2013-0129

Singh, V., Terjesen, S., & Vinnicombe, S. (2008). Newly appointed directors in the boardroom: How do women and men differ?. *European Management Journal, 26*(1), 48-58. https://doi.org/10.1016/j.emj.2007.10.002

Solanas, A., Selvam, R.M., Navaro, J., & Leiva, D. (2012). Some common indices of group diversity: Upper boundaries. *Psychological Reports, 111*(3), 777-796. https://doi.org/10.2466/01.09.21.PR0.111.6.777-796

Tajfel, H., & Turner, J.C. (1979). An integrative theory of intergroup conflict. In W.G. Austin & S. Worchel (Eds.), *The social psychology of intergroup relations* (pp. 33-37). Monterey, CA: Brooks/Cole.

Tajfel, H., & Turner, J.C. (1986). The Social Identity Theory of Intergroup Behavior. In S. Worchel & W.G. Austin (Eds.), *Psychology of Intergroup Relation* (pp. 7-24). Chicago: Hall Publishers.

Terjesen, S., Couto, E.B., & Francisco, P.M. (2016). Does the presence of independent and female directors impact firm performance? A multi-country study of board diversity. *Journal of Management and Governance, 20*(3), 447-483. https://doi.org/10.1007/s10997-014-9307-8

Turner, J.C. (1985). Social categorization and the self-concept: A social cognitive theory of group behavior. In E.J. Lawler (Ed.), *Advances in group processes: Theory and research* (pp. 77-121). Greenwich, CT: JAI Press.

UNDP (United Nations Development Programme). 2020. Human Development Report 2020: The Next Frontier: Human Development and the Anthropocene. New York.

Vafaei, A., Ahmed, K., & Mather, P. (2015). Board Diversity and Financial Performance in the Top 500 Australian Firms. *Australian Accounting Review, 25*(4), 413-427. https://doi.org/10.1111/auar.12068

Valaskova, K., Gajdosikova, D., & Pavic, T.K. (2022). How Important Is the Business Environment for the Performance of Enterprises? Case Study of Selected European Countries. *Central European Business Review, 11*(4), 85-110. https://doi.org/10.18267/j.cebr.300

Valls Martínez, M. del C., & Cruz Rambaud, S. (2019). Women on corporate boards and firm's financial performance. *Women's Studies International Forum, 76*(July), 102251. https://doi.org/10.1016/j.wsif.2019.102251

Velte, P. (2016). Women on management board and ESG performance. *Journal of Global Responsibility*, *7*(1), 98-109. https://doi.org/10.1108/JGR-01-2016-0001

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Acknowledgements and Financial Disclosure

We would like to extend our gratitude to the anonymous reviewers for their valuable feedback and insightful suggestions, which have significantly contributed to the improvement of this manuscript.

Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Published by Krakow University of Economics – Krakow, Poland

Ministry of Education and Science
Republic of Poland

The journal is co-financed in the years 2022-2024 by the Ministry of Education and Science of the Republic of Poland in the framework of the ministerial programme “Development of Scientific Journals” (RCN) on the basis of contract no. RCN/SP/0583/2021/1 concluded on 13 October 2022 and being in force until 13 October 2024.

EBER
Entrepreneurial Business and Economics Review
2024, Vol. 12, No. 2
10.15678/EBER.2024.120204

What makes them dream big? Determinants of business growth aspirations among Polish students

Jakub Golik

ABSTRACT

Objective: The objective of the article is to explore the concept of business growth aspirations and identify its determinants at an early stage of the entrepreneurial process. In this exploratory study, I focused on the underexplored approach to entrepreneurial process i.e. to study the growth aspirations and its determinants alongside entrepreneurial intentions. Studying growth aspirations and their determinants provides valuable insights into how these aspirations form. This contributes to the literature and future empirical studies on the entrepreneurial process.

Research Design & Methods: On the basis of a literature review, I identified the potential determinants of growth aspirations with a focus on understudied individual and sociocultural dimensions. I tested them empirically using binomial logistic regression on data obtained from 757 students from three universities in northern Poland. The proposed model includes growth aspirations as an endogenous variable and eight exogenous variables. Firstly, I described the sample with descriptive statistics and correlation matrix using appropriate correlation coefficients (Spearman for variables using ordinal scale and Yule's phi for binary variables), which I followed with the collinearity checks with the use of variance inflation factors (VIFs). Finally, I discussed the goodness of fit with the discussion of prediction accuracy.

Findings: The results show that entrepreneurial self-efficacy and entrepreneurial intention proved to be statistically insignificant. Eventually, I found six of the variables to influence the declared growth aspirations of respondents in a statistically significant way, namely: gender, family business background, entrepreneurial role model, declared resistance to stress, and perception of higher income and prestige as the most attractive features of entrepreneurship. Moreover, I identified a gender gap in growth aspirations. Finally, I verified five out of eight proposed research hypotheses and discussed the conclusions.

Implications & Recommendations: The most important finding shows the presence of a gender gap in growth aspirations as early as at the time of studies. Therefore, it is advised that policymakers focus on this gap while designing entrepreneurship courses and take it into account. Secondly, it is important to accurately measure stress resistance among students, to show it as a potential advantage, and to teach safe coping strategies. Furthermore, it is recommended to promote the high social status of entrepreneurs, both in the financial (potentially higher income) and non-financial sense (prestige and satisfaction) while at the same time consciously educating about potential dangers.

Contribution & Value Added: The study makes an original contribution to the literature on growth aspirations by answering the call to further explore their potential antecedents and is one of the first to do so at the earliest stage of the entrepreneurial process. It is achieved by studying determinants pertaining to sociocultural and individual dimensions which – according to some studies – require further investigation. Moreover, it is done in an unexplored context of students in a developing country in Europe. Finally, the article recognises the ambiguity in defining growth aspirations and suggests a clear distinction to be included in the literature and future research.

Article type:	research article
Keywords:	growth aspirations; growth intentions; entrepreneurship; entrepreneurial intention; determinants
JEL codes:	L21, L25, L26

Received: 11 June 2023 Revised: 6 December 2023 Accepted: 16 January 2024

Suggested citation:
Golik, J. (2024). What makes them dream big? Determinants of business growth aspirations among Polish students. *Entrepreneurial Business and Economics Review,* 12(2), 61-77. https://doi.org/10.15678/EBER.2024.120204

INTRODUCTION

In the field of entrepreneurship, probably the most commonly researched dependent variable is new venture creation as the ultimate step in the entrepreneurial process. Its antecedents were extensively analysed in the field using the two most prevailing theories such as Ajzen's theory of planned behaviour (TPB) (Ajzen, 1991, 2011, 2020) or Shapero's entrepreneurial event (SEE) (Shapero & Sokol, 1982) both asserting that the best predictor of action is intention. The most common determinant of new venture creation is considered to be the entrepreneurial intention, which has been studied at every stage of entrepreneurial process (from students and nascent entrepreneurs to actual entrepreneurs) (Meoli *et al.*, 2020). The entrepreneurial intention has been at the centre of the attention of entrepreneurship scholars for quite a while now. However, in this study, I propose to focus on a much less explored approach to entrepreneurial process, namely, to study the growth aspirations and its determinants alongside entrepreneurial intentions.

The prevailing classification of enterprises in both economic and entrepreneurship research is pertaining to their size. Small and medium-sized enterprises (SMEs) are the core term in the statistical analysis of Eurostat (European Statistical Office) as well as leading entrepreneurship reports such as Global Entrepreneurship Monitor (GEM) (Boutaleb, 2023). For both economic growth and intensive job creation, business growth is the essential issue. As Levie and Autio (2013) claim, the proportion of entrepreneurs who want to grow their businesses is a more reliable predictor of economic growth than general start-up rates or self-employment rates. A high self-employment rate or high rate of entrepreneurship may not contribute to higher economic growth, either because of the characteristics of some entrepreneurial ventures (Baumol, 1996) or because of the suboptimal size of businesses if there are too many of them in the economy. For developing economies, there is a clearly negative relation between the level of development and the rate of entrepreneurship (Belso Martínez, 2005; Carree *et al.*, 2007; Wennekers & Thurik, 1999). Therefore, for developing economies, the 'quality' of entrepreneurship (the potential to grow businesses) should be more important than its 'quantity' (the number of businesses operating in the economy). The analysis of business growth and its antecedents seems to be even more important in the recovery phase from the global COVID-19 pandemic.

The majority of studies concerning business growth are focused on resource-based factors such as e.g. size, sector, or turnover, and yet they are inconclusive concerning a consistent set of growth determinants (Gancarczyk, 2019; Shepherd & Wiklund, 2009). However, there seems to be no doubt that one of the key predictors of actual business growth is the growth intention of entrepreneurs (Delmar & Wiklund, 2008; Estrin *et al.*, 2022; Gruenwald, 2013; Kolvereid & Isaksen, 2017; Puente *et al.*, 2017; Wiklund & Shepherd, 2003). And conversely, actual business growth is rarely achieved without explicit growth intention (Stam *et al.*, 2012). Interestingly, some studies indicate that the success of newly funded businesses does not necessarily depend on the experience of the funders as entrepreneurs between 25 and 35 years of age are significantly more successful than those between 35 to 45 (Bindewald, 2004; Gruenwald, 2019). Therefore, while I acknowledge the importance of the growth intentions of actual entrepreneurs, the attitude towards the growth of business is also important in the case of early-stage entrepreneurs, such as nascent entrepreneurs or even potential entrepreneurs (Hechavarria *et al.*, 2009). Thus, the early identification of determinants is valuable for research on every stage of the entrepreneurial process. Studying potential entrepreneurs such as business students is justified by the findings of Kolvereid and Bullvag (1996), who claim that past growth intentions are related to present growth intentions, i.e. growth intentions of students may translate into their growth intentions as entrepreneurs, when they start their business, even if total stability of such growth intentions is not maintained over time.

At this point it is important to realise that the terms 'growth intentions' and 'growth aspirations' are often used interchangeably in the literature, and there is no uniform terminology here. Similar labels are used for describing basically the same (or very similar) phenomenon: growth intentions (Estrin *et al.*, 2022), growth aspirations (Wang *et al.*, 2019), growth ambitions (Estrin *et al.*, 2022), growth expectations (Estrin *et al.*, 2022; Stam *et al.*, 2012), growth preference (Siepel *et al.*, 2015), growth motivations and

willingness (Douglas, 2013; Stam *et al.*, 2012). I suggest that the term 'growth intentions' should be attributed to actual entrepreneurs, as they answer the question of 'how big I want my business to be' and focus on concrete actions that can be taken with respect to an existing business. Conversely, the term 'growth aspirations' should be attributed to potential and nascent entrepreneurs, as they answer the question of 'how big I would like my future/fledgling business to be' and focus on rather hypothetical actions that may happen in the future. Intentions are more about plans, whereas aspirations are more about dreams. Therefore, for the sake of clarity and coherence of the article, from this point onward, I am going to refer only to the growth aspirations in the pursuit of factors that shape those aspirations.

It is one of the first studies to explore the determinants of growth aspirations at the earliest stage of the entrepreneurial process. The novelty of the article is threefold. Firstly, it answers the call to explore factors affecting growth aspiration which are understudied in the field (Ali, 2018; Byrne & Fayolle, 2013). Secondly, the research focused on sociocultural antecedents pertaining to contextual and individual factors, which have not yet attracted the research attention they deserve (Levie & Autio, 2013; Puente *et al.*, 2017; Thornton *et al.,* 2011). Finally, the study setting was rare (Puente *et al.*, 2017) as it concerned students in a developing country who are about to enter the labour market or become entrepreneurs. This context is important due to the fact that such insight might be used to accordingly tailor entrepreneurship education to boost growth aspirations or to adopt policies concerning entrepreneurship which – in developing countries – aim mainly at increasing the potential to grow businesses. Therefore, I argue that exploration of antecedents should be made from the earliest stages, in this case, from students who might become entrepreneurs in the near future. Finally, exploring the variables' antecedents is important to understand the underlying process and extend theory development.

This empirical article has an exploratory character and aims to identify determinants of business growth aspirations based on the previous findings in the literature using binomial logistic regression. The examination of growth aspirations and identification of their determinants may offer valuable insights into how such aspirations are formed, and therefore, contribute to the literature and future empirical studies at every stage of the entrepreneurial process.

In the remainder of the article I will present research hypotheses development alongside relevant literature review. Secondly, I will present research methodology including data and sample descriptions. Thirdly, I will present results of binomial logistic regressions together with the summary of research hypotheses verification. Finally, I will discuss conclusions and study limitations.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Growth, and especially high growth is not the goal most entrepreneurs pursue (Estrin *et al.*, 2022; Kolvereid & Bullvag, 1996; Kolvereid & Isaksen, 2017; McKelvie *et al.*, 2017; Stam *et al.*, 2012; Wiklund & Shepherd, 2003). Among actual entrepreneurs, nearly 40% did not want their firms to grow (Kolvereid, 1992). Panel Study of Entrepreneurial Dynamics II suggests that only one in five nascent entrepreneurs want to grow their business to be 'as big as possible' (Hechavarria *et al*., 2009). In a more recent study among start-ups, 75% of respondents stated that 'I want a size I can manage myself or with a few key employees' (Hurst & Pugsley, 2011). Those involved in new firm formation typically show no growth aspirations (Henrekson, 2005; Levie & Autio, 2013; Wiklund & Shepherd, 2003).

Business growth is a result of purposeful actions carried out over time (Ali, 2018; Wiklund & Shepherd, 2003). In the case of small or fledgling firms (which are generally small because of their age) those actions are undertaken when they are consistent with the entrepreneur's personal goals. Therefore, the entrepreneurs' aspirations to grow their businesses are necessary (yet not sufficient) for actual growth, especially in the small business sector and they are the central predictor of the actual growth (Kolvereid & Bullvag, 1996; Stenholm, 2011). If growth aspirations are necessary for business growth itself, then the exploration of their determinants constitutes a viable research subject.

One of the earliest studies on this topic was published by Kolvereid (1992), who used the term 'growth aspirations.' Kolvereid found those growth aspirations not to be related to entrepreneurs' gender and experience, business location, or size. On the other hand, factors that mattered included entrepreneurs' higher level of education, type of business (manufacturing rather than service), and a higher

number of competitors. Venugopal (2016) examined some cognitive and contextual factors influencing growth aspirations on the basis of the theory of planned behaviour (TPB). Among them, entrepreneurial self-efficacy (ESE) is defined in seminal work by Boyd and Vozikis (1994) as a person's belief in his or her capability to perform a task. It was found to be especially important for growth aspirations, as well as for family support, although its impact was different depending on the phase of the business life cycle. Various factors rooted in the concept of social capital and their impact on growth aspirations were studied in an interesting specific context of post-conflict countries (Efendic *et al.*, 2014; Tominc & Rebernik, 2007a). Growth aspirations were also analysed in the context of gender entrepreneurship in high-growth firms (Bulanova *et al.*, 2016), as well as in terms of differences between women and men entrepreneurs across their life course (Davis & Shaver, 2012). The cognition-based model of the evolution of growth aspirations should also be mentioned here (Dutta & Thornhill, 2008).

Puente and colleagues (2017) proposed a clear division of determinants affecting growth aspirations into three categories. The first category concerns environment (context) and includes sociocultural factors *i.a.* social and cultural norms, entrepreneurship as a desirable career or recognition. The second category pertains to individual characteristics *e.g.* skills, motivation, education, age, or gender. The last one concerns the business itself and includes factors such as size, number of owners, capital, or innovativeness. The authors indicate that among them, sociocultural determinants are investigated the least (Levie & Autio, 2013; Puente *et al.*, 2017; Thornton *et al.*, 2011). In my study, I followed the abovementioned framework and intend to contribute to the stream of entrepreneurship literature focusing on individual and sociocultural determinants of growth aspirations (Levie & Autio, 2013; Puente *et al.*, 2017).

I propose eight hypotheses related to potential factors influencing growth aspirations based on the review of prior research. Four of them pertain to the individual dimension, *i.e.*: gender; entrepreneurial self-efficacy (ESE) & entrepreneurial intention (EI); and self-reported resistance to stress. The remaining four are related to the socio-cultural dimension, *i.e.*: the perception of high income & prestige as potential attractive advantages of running own business; the fact of family running a business; and the presence of role models among parents.

The first one is gender as an obvious exogenous variable present in the majority of models, however not merely for control purposes. There is a vast and still growing gender literature in the field of entrepreneurship. On the nexus of gender and business growth literature, a recent study by BarNir (2021) emerges with findings such that, for instance, perceived gender stereotyping affects the type of ventures women prefer to start. Women are less likely to run growth-oriented ventures and lean towards more communal-type ventures often with lower expectations for growth than those started by men (BarNir, 2021; Puente *et al.*, 2017; Wang *et al.*, 2019). Another study concerning gender and growth aspirations is by Wang and colleagues (Wang *et al.*, 2019), who prove that the institutional environment of an entrepreneurial ecosystem fosters the gender gap in entrepreneurial growth aspirations in China. Furthermore, Ng and Fu (2018) indicate that gender differences with regard to enterprise growth require further investigation. However, due to the fact that China is both geographically distant and culturally different from Poland, an example of a study on gender impact on growth aspirations from more similar countries should be identified. Works by Tominc (Širec *et al.*, 2010; Tominc & Rebernik, 2007a; 2007b) explore, among others, entrepreneurship and growth aspirations in Slovenia, Hungary, and Croatia – countries both geographically and culturally closer to Poland. Their results are interesting as they find out that among early-stage entrepreneurs in these countries, men are more likely to perceive and exploit business opportunities than women, while women on average are less likely to start new firms. However, once started, woman entrepreneurs have similar growth aspirations as men. It shows that there exists an ambiguity in current knowledge about gender and growth aspirations providing another argument for further investigation.

However, based on the abovementioned research and other studies (*e.g.* Manolova *et al.*, 2012) suggesting that women students are less likely to pursue high growth in their future businesses, I hypothesised:

H1: Gender influences growth aspirations in the way that women students are less likely to express high growth aspirations in comparison to men.

Next two factors are connected to the previously mentioned, two predominantly used theories for researching the entrepreneurial process, *i.e.* the theory of planned behaviour (TPB) (Ajzen, 1991, 2011, 2020) and Shapero's entrepreneurial event (SEE) (Shapero & Sokol, 1982). According to them, attitudes successfully predict intentions and subsequently, intentions successfully predict behaviour (Krueger *et al.*, 2000). Both models contain elements of perceived self-efficacy. The proposed factors to be included in this research are entrepreneurial intention (EI) and entrepreneurial self-efficacy (ESE). The link between those two concepts can be found in Shapero's model of entrepreneurial event (SEE) (Shapero & Sokol, 1982). It is known that entrepreneurial self-efficacy plays a pivotal role in determining entrepreneurial intentions and outcome expectations, therefore, usually the higher the individual's entrepreneurial self-efficacy, the higher the entrepreneurial intentions (Liguori *et al.*, 2018; Uansa-Ard & Wannamakok, 2022; Udayanan, 2019; Zięba & Golik, 2018). In line with the theory and previous empirical research, it is viable to hypothesise that if entrepreneurial self-efficacy influences the entrepreneurial intention and the latter is considered a good predictor of actual action, therefore both of these factors might affect the growth aspiration. In the context of students, one can argue that those who have already decided to start their own business may be more entrepreneurial and proactive than those who have not made such decision yet. They may also be more success-oriented and more willing to grow their business. Moreover, the suggestion to include entrepreneurial self-efficacy in the research on growth aspirations was also stated by Venugopal (2016). All of the above translates into the second and third research hypotheses involving the entrepreneurial intention (EI) and entrepreneurial self-efficacy (ESE) respectively:

H2: Students who express higher entrepreneurial intentions are more likely to express high growth aspirations.

H3: Students who declare higher levels of entrepreneurial self-efficacy are more likely to express high growth aspirations.

Another factor pertains to the stream of research on family background and succession. It is especially important while studying students as they are more likely to have recent experiences and direct contact with their families and entrepreneurs among their relatives. In turn, this exposure might affect their intentions and aspirations. Family business background is known as a factor contributing to development of the entrepreneurial intention (Carr & Sequeira, 2007). This holds also in the case of students (Georgescu & Herman, 2020), especially when it is manifested through involvement in family business operations (Murphy & Lambrechts, 2015; Wang *et al.*, 2018). Fahed-Sreih and colleagues found that family participation in the form of employment and investment positively impacts entrepreneurial growth intentions and expansion plans (2009). Moreover, Ali (2018) highlights the importance of family background to the growth and success of small businesses while acknowledging that being raised in an entrepreneurial family greatly impacts growth aspirations. Similarly, family support and direct family involvement positively moderate the relationship between attitude to growth and growth aspirations (Venugopal, 2016). However, it might not always be the case as the study on new venture teams shows that the presence of family members in the team is negatively related to growth aspirations (Muñoz-Bullón *et al.*, 2020). Nevertheless, as the previous research suggests that a family business background helps in developing entrepreneurial intentions, I hypothesised that it may also contribute to higher growth aspirations. Therefore, it translates into the fourth hypothesis regarding family business background:

H4: Students who have family business backgrounds are more likely to express high growth aspirations.

In line with the previous factor pertaining to the family background, I proposed to consider the influence and exposure to role models as the subsequent factor. If one has a family business background, there is a substantial likelihood that we may find a role model affecting one's attitudes. For instance, in the light of social learning theory, parents' entrepreneurial role model is intricately connected with choosing an entrepreneurial career through increased education and training aspirations, and improved self-efficacy (Scherer *et al.*, 1989). There is also a stream of research indicating that role models positively affect the entrepreneurial intention (Abbasianchavari & Moritz, 2021; Austin &

Nauta, 2016; Bosma *et al.*, 2012; Karimi *et al.*, 2014; Laviolette *et al.*, 2012). In the context of Polish students, Nowiński and Haddoud suggest that the interplay of inspiring role models, attitudes towards entrepreneurship and entrepreneurial self-efficacy is the key to fostering entrepreneurial intention (2019). When it comes to role models influence on growth aspirations, there is evidence that role models tend to increase these aspirations (Capelleras *et al.*, 2019). Moreover, some recent studies confirm the importance of entrepreneurial learning from role models (Abbasianchavari & Moritz, 2021; Cardella *et al.*, 2020; Zozimo *et al.*, 2017). Lastly, role models are also crucial for developing entrepreneurial passion (Fellnhofer, 2017), which contributes to business growth. Taking all of the above into consideration, I propose to include family role models as a next factor potentially influencing growth aspirations. Therefore, it translates into the fifth research hypothesis:

H5: Students who have family business backgrounds are more likely to express high growth aspirations.

The last three factors are connected with the perception of selected features of entrepreneurship. In line with the theory of planned behaviour (TPB) and Shapero's entrepreneurial event (SEE), they pertain to the elements of these theories such as expected values and perceived desirability which translate into intentions formulation. The way how individuals perceive certain aspects of running own business affects their intentions and aspirations. Often, nascent entrepreneurs are driven by the vision of high income and/or prestige. I based the next two hypotheses on achievement orientation (*i.e.* when an individual feels a need to perform their tasks to an elevated level of excellence). I focused on two dimensions of achievement orientation in running own business: financial and social (Arshad *et al.*, 2020). In line with this perspective, I argued that those students who seek financial reward would naturally like their business to be big, as the stream of profits for entrepreneurs is usually positively related to the business size. Therefore, I formulated the sixth research hypothesis related to the perception of high income as a potentially attractive feature of entrepreneurship:

H6: Students who perceive high income as one of the most attractive features of entrepreneurship are more likely to express high growth aspirations.

Conversely, some individuals may be more interested in the social dimension of achievement. This would be associated with social recognition and the high prestige of a successful entrepreneur (Anderson & Jack, 2000; Arshad *et al.*, 2020; Ayodele *et al.*, 2020). Plenty of previous research has confirmed prestige as one of the driving factors in the pursuit of an entrepreneurial career, in particular some of them among students (Anderson & Jack, 2000; Ayodele *et al.*, 2020; Chan *et al.*, 2019; Constant & Shachmurove, 2006; Constant & Zimmermann, 2006; Giannetti *et al.*, 2003; Kaur & Bawa, 1999; Kontogiannis *et al.*, 2019). Analogically to the previous factor, in this case, the level of recognition and prestige should be dependent on the business size, making growth more attractive and desired. Thus, I formulated the seventh research hypothesis related to entrepreneurship being a potential source of prestige:

H7: Students who claim that prestige belongs to the most attractive features of entrepreneurship are more likely to express high growth aspirations.

Finally, the last factor concerned potentially negative aspects of entrepreneurship. The two most commonly stated negative aspects of entrepreneurship are stress and work-life balance (Ziemiański & Golik, 2020). Students who would like to grow their future businesses should realise that it is associated with a lot of stress. Conversely, if they perceive themselves as stress-resistant, they may not find it as a growth obstacle. Therefore, I formulated the last research hypothesis pertaining to the declarative stress resistance:

H8: Students who declare higher stress resistance are more likely to express high growth aspirations.

Having presented the relevant literature review and research hypotheses stemming from it, in the following part of the article, I will present the description of the data used, the research methodology, and the estimations results.

RESEARCH METHODOLOGY

The data used in the research came from a SEAS Project (Survey on Entrepreneurial Attitudes of Students). The SEAS Project started in 2008 as a longitudinal study of students' entrepreneurship attitudes, their determinants, and antecedents, combined with a career choice study, education process evaluation, and other student-related issues. Questions in the SEAS questionnaire have been designed to measure or investigate *i.a.* students' entrepreneurial intentions, entrepreneurial self-efficacy, work experience, and the presence of entrepreneurs in the family. The project is conducted in the form of an annual quantitative study.

The research sample consisted of 757 students of courses such as economics, econometrics, management, business studies, and other related courses from three universities in northern Poland. The vast majority (more than 82%) were full-time students. Bachelor or engineering students constituted 64.3% of the sample, while master students – 35.7%. Regarding work experience, 74% of all respondents indicated to have work experience, while 48.2% of students were employed at the moment of survey distribution. Finally, only 13 students (less than 2%) owned a company.

Based on the presented theory, literature review, data availability from the project, and previous experience, I used a binomial logistic regression model with growth aspirations as an endogenous variable and eight exogenous variables mentioned in the research hypotheses, *i.e.*: gender, entrepreneurial intention, entrepreneurial self-efficacy family business, role model, high income, prestige, and

Table 1. Variables description and measurement

Variable	Description *examples of questions (translated from Polish)*	Scale	Measurement	Level
GA	Growth Aspirations – endogenous variable	ordinal	binary	0 = 'low' 1 = 'high'
If you were to start a business, ultimately in terms of size you would like it to be: *0 – big enough to be able to manage it by myself or with the help of a few key employees* *1 – as big as possible*				
SEX	Gender	nominal	binary	0 = 'man' 1 = 'woman'
EI	Entrepreneurial Intention – average value from 5 items	continuous	Likert-5	1 = 'low' to 5 = 'high'
Please indicate to what extent you agree with the following statements: *I do intend to start my own business one day. (1 of 5 statements)*				
ESE	Entrepreneurial Self-efficacy	ordinal	Likert-5	1 = 'low' to 5 = 'high'
Please indicate to what extent you agree with the following statement: *I am convinced that I would be able to successfully start a new venture.*				
FB	Family business: family running a business	nominal	binary	0 = 'NO' 1 = 'YES'
Is anyone from your close family (parents and/or grandparents) running a business?				
RM	Role model: one of the respondent's parents owns and runs a business	nominal	binary	0 = 'NO' 1 = 'YES'
Does your father or mother own and run a business?				
HI	High income: considering *high income* as one of the most attractive advantages of running own business	nominal	binary	0 = 'NO' 1 = 'YES'
PREST	Prestige: considering *prestige* as one of the most attractive advantages of running own business	nominal	binary	0 = 'NO' 1 = 'YES'
Please indicate which of the following advantages of running your own business you consider as the most attractive to you (select max. 3). (out of 8)				
STRESS	Stress: self-reported resistance to stress	ordinal	Likert-5	1 = 'low' to 5 = 'high'
Please indicate to what extent do you agree with the following statement: *I am resistant to stress.*				

Source: own study.

stress. As the final model has been created through the use of a backward elimination method (sequentially eliminating statistically insignificant variables with regard to the p-value), altogether, I will present three models to show the whole process. For the convenience of the reader, I described all variables in Table 1, including information regarding the used scale and the level of measurement.

The questionnaires in the SEAS Project are administered personally to the students in the traditional pen and paper form, hence, I had to check the data for logical inconsistencies within selected questions and missing values. After the data clean-up, the initial research sample of 757 was free from logical mistakes. However, some missing values were present in the questions of interest (such observations were omitted in the regression as the question type did not allow for a reasonable attempt at data imputation). Therefore, the models presented below have a lower number of observations than the initial sample, ranging from 700 in Model 1 to 705 in Model 2 and Model 3.

Firstly, correlations and variance inflation factors (VIF) have been checked for all variables included in all estimated models. Descriptive statistics and correlation matrix can be found in Table 2 below.

Table 2. Descriptive statistics: Mean, standard deviations, Spearman and Yule's phi correlation coefficients

Variables	Mean	SD	1	2	3	4	5	6	7	8
1. GA	0.194	0.396								
2. SEX	0.643	0.479	-0.204***							
3. EI	3.100	0.926	0.116**	-0.035						
4. ESE	3.480	0.805	0.084*	-0.063	0.513***					
5. FB	0.154	0.361	-0.021	-0.049	0.159***	0.129***				
6. RM	0.236	0.425	0.078*	-0.026	0.188***	0.127***	0.559***			
7. HI	0.487	0.500	0.109**	-0.131***	0.141***	0.057	0.091*	0.074*		
8. PREST	0.104	0.306	0.112**	-0.098**	-0.001	0.026	-0.024	0.024	0.030	
9. STRESS	3.220	1.090	0.147***	-0.123***	0.181***	0.331***	0.033	0.026	0.002	-0.010

Note: significant codes: 0 '***' 0.001 '**' 0.01 '*'; Due to the binary character of variables SEX; FB; RM; HI and PREST, Yule's phi correlation coefficient was used for them instead of Spearman. For reader's convenience, variables not included in the final Model 3 have been greyed out.
Source: own study.

All correlations of exogenous variables with endogenous variables (growth aspiration) were statistically significant except for the variable family business (FB). The highest correlation (in absolute terms) between exogenous variables was between the pair of variables role model (RM) and family business (FB) and was equal to 0.559. The correlation matrix did not indicate any serious correlation concerns.

RESULTS AND DISCUSSION

Ultimately, the following binomial logistic regression models presented in Table 3 have been estimated. The variance inflation factors (VIFs) for all exogenous variables in all three models did not exceed 1.64 (the highest VIF was found for the variable ESE in Model 1) which met the strictest VIF thresholds regarding testing for collinearity (Johnston *et al.*, 2018).

The results of the first estimation (Model 1) show that surprisingly, from the set of included exogenous variables, some turned out to be statistically insignificant. These were entrepreneurial self-efficacy (ESE), high income (HI), and the entrepreneurial intention (EI) (from highest to lowest p-values). Therefore, the backward elimination method of statistically insignificant variables was introduced resulting in the estimation of Model 2 and the final Model 3. In the process, I eliminated two variables, namely entrepreneurial self-efficacy (ESE) and entrepreneurial intention (EI) from the initial set of regressors and I did not include them in the final Model 3. Table 3 includes goodness of fit measures, which summarise all estimations. Noteworthy, all models are overall statistically significant and have decent values of pseudo-R-squared being close to 0.13. I used pseudo-R-squares in logistic regressions to imitate R-squared from traditional regression models (based on the proportion of variance explained by the model). However, they differ in both typical values and interpretations.

Table 2. Binomial logistic regressions: Sequential elimination of statistically insignificant variables from Model 1 to Model 3

Predictors	Model 1 n = 700				Model 2 n = 705				Model 3 n = 705			
	Odds ratio	**β coeff**	**SE**	**p-value**	**Odds ratio**	**β coeff**	**SE**	**p-value**	**Odds ratio**	**β coeff**	**SE**	**p-value**
const.	0.0867	-2.445	0.535	< 0.001***	0.0685	-2.681	0.4859	< 0.001***	0.105	-2.257	0.4019	< 0.001***
SEX	0.4175	-0.873	0.205	< 0.001***	0.4073	-0.898	0.2035	< 0.001***	0.406	-0.902	0.2027	< 0.001***
EI	1.2603	0.231	0.134	0.084	1.2010	0.183	0.1131	0.105				
ESE	0.8654	-0.145	0.158	0.359								
FB	0.3823	-0.962	0.355	0.007**	0.3848	-0.955	0.3489	0.006**	0.396	-0.927	0.3462	0.007**
RM	1.8840	0.633	0.270	0.019*	1.9460	0.666	0.2678	0.013*	2.048	0.717	0.2641	0.007**
HI	1.4206	0.351	0.206	0.088	1.4378	0.363	0.2049	0.076	1.503	0.407	0.2027	0.044*
PREST	1.9951	0.691	0.287	0.016*	1.9480	0.667	0.2866	0.020*	1.931	0.658	0.2855	0.021*
STRESS	1.3552	0.304	0.106	0.004**	1.3098	0.270	0.0999	0.007**	1.357	0.305	0.0971	0.002**
Nagelkerke's R^2			**0.129**				**0.133**				**0.127**	
Deviance			630				636				639	
AIC			648				652				653	
Overall Model p-value			< 0.001***				< 0.001***				< 0.001***	

Note: Significant codes: 0 '***' 0.001 '**' 0.01. '*'; Estimates represent the log odds of 'GA = 1' vs. 'GA = 0.'

Source: own calculation.

The achieved odds ratios in Model 3 supported hypotheses 1, 5, 6, 7, and 8. I could not verify hypotheses 2 and 3 due to the corresponding variables (EI and ESE) having been dropped in the backward elimination process. Furthermore, I did not find support for the fourth hypothesis stating that students who have family business backgrounds are more likely to express high growth aspirations, as the odds ratio for the variable FB was 0.396 (lower than one) indicating that such students are less likely to express high growth aspiration.

Overall prediction accuracy of the Model 3 was satisfactory (accuracy equal to 0.701) ranging from 0.601 in sensitivity to 0.725 in specificity with a cut-off value set to 0.22. Noteworthy, both sensitivity (true positive rate) and specificity (true negative rate) are important for the model's prediction purposes. Therefore, I subjectively selected a cut-off value of 0.22 to balance the model's positive and negative prediction powers. Table 4 presents a detailed classification of prediction accuracy.

Table 4. Prediction accuracy and classification table of Model 3

Observed	**Predicted**		**% correct**
	0	**1**	
0	411	156	72.5
1	55	83	60.1
Accuracy	**Specificity**	**Sensitivity**	**AUC**
0.701	0.725	0.601	0.698

Note: the cut-off value has been set to 0.22.
Source: own study.

To summarise the results upfront for the reader in a convenient way, I created Table 5, which summarises research hypotheses and their verification according to the results.

Table 5. Summary of research hypotheses verification

Nr	**Hypothesis**	**Verification**
H1	Gender influences growth aspirations in the way that woman students are less likely to express high growth aspirations in comparison to men.	supported
H2	Students who express higher entrepreneurial intentions are more likely to express high growth aspirations.	not supported
H3	Students who declare higher levels of entrepreneurial self-efficacy are more likely to express high growth aspirations.	not supported
H4	Students who have family business backgrounds are more likely to express high growth aspirations.	not supported
H5	Students who have entrepreneurial role models in their families are more likely to express high growth aspirations.	supported
H6	Students who perceive high income as one of the most attractive features of entrepreneurship are more likely to express high growth aspirations.	supported
H7	Students who claim that prestige belongs to the most attractive features of entrepreneurship are more likely to express high growth aspirations.	supported
H8	Students who declare higher resistance to stress are more likely to express high growth aspirations.	supported

Source: own study.

The results show that the entrepreneurial intention (EI) does not influence growth aspirations and neither does entrepreneurial self-efficacy (ESE). Therefore, I found no support for hypotheses 2 and 3. The former lack of influence may be interpreted in such a way that having the entrepreneurial intention does not necessarily imply this intention to be connected to growth because, as shown at the beginning of the literature review, the majority of people involved in new venture formation typically show no growth aspirations. However, it remains an important question why this is the case. On the other hand, it comes as no surprise that without the entrepreneurial intention, there are no growth intentions, as they were expressed regardless of whether the respondent has already decided to start

a business or not. Therefore, the entrepreneurial intention in the setting of my study had no statistically significant influence on growth aspirations. The latter lack of influence (concerning ESE) is more difficult to explain. However, one possible explanation is the highly contextual character of ESE (Liguori *et al.*, 2018). In my study, I asked about ESE on a general level, without the focus on business growth. However, as ESE is usually treated as a direct antecedent of EI in studies of the entrepreneurial process (*i.e.* ESE positively affects EI) based on the theory of planned behaviour, this is in line with the previous result stating that EI does not influence growth aspirations.

Another interesting result of the study is the negative (in a sense of lowering probability) influence of family business background. As the odds ratio for FB predictor (family business – family running a business) is lower than one and the estimates represent the log odds of high vs low growth aspirations, it means that having a family business background lowers the probability of high growth intentions. I expected it to have a positive influence on growth aspirations and a similar effect to the role model which contrary to family business positively influences the probability of higher growth aspirations. Especially since those two variables are correlated (Table 2). We may find possible explanations in previous works on family business background and its impact on career choice (Wang *et al.*, 2018; Zellweger *et al.*, 2011). The discrepancy between effects of these two variables (FB negative and RM positive) can be explained on the basis of other studies. Arguably, when exposed to the business reality through their family business, respondents may become more realistic about growth possibilities and hence family business background may actually lower their growth aspirations. This difference might also stem from the fact that the question pertaining to the family business (FB) concerned two generations (parents and grandparents), while the question of role model (RB) only one *i.e.* parents. Importantly, grandparents of current students might have started their businesses in a pre-transformational era in Poland (*i.e*. prior to 1989). As the image and sociocultural status of an entrepreneur in Poland has changed dramatically since then, it might be one of the potential explanations for the differences between these two results. Nevertheless, this aspect requires further investigation in future studies both in the context of Poland and other countries.

Other variables included in my study influence the growth aspirations of students in line with the expectations based on the literature. According to the proposed logistic model where estimates represent the log odds of high vs low growth aspirations, odds ratios higher than 1 indicate that the higher values of the particular predictor increase the probability of having high growth intentions. Conversely, an odds ratio lower than one indicates that higher values of this predictor lower the probability of having high growth aspirations. As the odds ratio is lower for the predictor SEX, and the variable took the value of 0 for man and 1 for woman, it means that high growth aspirations are less likely among women. This result is of special importance, as it is in line with the stream of research concerning the gender gap and lower growth aspirations of women in comparison to men across various stages of the entrepreneurial process (Ali, 2018; Ng & Fu, 2018; Puente *et al*., 2017; Wang *et al*., 2019). Therefore, my results showcase that we can notice this gender gap already at the studies stage.

In terms of the sociocultural determinants, the results clearly indicate that the perception of potential high income and prestige stemming from being an entrepreneur can be considered as drivers of growth aspirations. A straightforward explanation is that if an individual is enticed by potential high income, it can be associated with and achieved by the growth of the business. Therefore, it translates into higher growth aspirations. Analogously, if an individual has a similar view of the prestige connected with being an entrepreneur, he or she will strive to grow as it can be assumed that the bigger the company, the higher the prestige of being its owner. Thus, the environment and social norms can be valuable predictors of growth aspirations.

Finally, as being an entrepreneur can be stressful itself, running a company with the intention to grow can elevate that stress further. Unsurprisingly, the results indicate that individuals characterised by higher stress resistance (a self-reported measure) are more likely to express higher growth aspirations as they might claim to have the necessary capabilities to manage the related stressful situations connected to firm growth.

Recapitulating, based on the proposed model, the factors that positively affect growth aspirations (*i.e.* increase them) are: being a man; having an entrepreneurial role model in the family; perception

of high income as an attractive feature of entrepreneurship; perception of prestige as an attractive feature of entrepreneurship; and finally, declarative high stress resistance.

We may consider the abovementioned factors as good candidates for predictors of growth aspirations. Therefore, potentially contributing to economic growth through potential future entrepreneurs. In the light of my findings, it would be advisable to develop stress resistance among students and promote entrepreneurs' high social status, both in the financial (potentially higher income in comparison to wage jobs) and non-financial sense (prestige and satisfaction). That would encourage high growth aspirations. Nevertheless, the gender gap in growth aspirations is clearly visible in the example of this study and this should be the target of decision-makers and entrepreneurship educators at all levels.

CONCLUSIONS

The study contributes to the literature on growth aspirations by answering the call to further explore their potential antecedents (Ali, 2018; Byrne & Fayolle, 2013). I achieved it by studying eight determinants pertaining to sociocultural (perception of high income & prestige as potential attractive advantages of running own business; the fact of family running a business; and the presence of role models among parents) and individual (gender; entrepreneurial self-efficacy (ESE) & the entrepreneurial intention (EI); and self-reported resistance to stress) dimensions which according to some studies require further investigation (Levie & Autio, 2013; Puente *et al.*, 2017; Thornton *et al.*, 2011). Moreover, I did it in an unexplored context of students in a developing country in Europe. Finally, the study modestly indicates the need for clear and cohesive definitions of notions pertaining to growth as currently multiple terms are being used interchangeably.

The results show that from individual determinants only declarative resistance to stress and the fact of being a man increase the chances of having high growth aspirations. The latter result is of vital importance, as it shows the presence of a gender gap in growth aspirations as early as at the time of studies. Therefore, one of the most important study recommendations is to focus on this gap while designing entrepreneurship courses. To begin with, it ought to be done by raising awareness of gender gaps pertaining not only to growth aspirations, by teaching of its roots, and finally by showing the solutions to mitigate them. When it comes to stress resistance, it is important to accurately measure it among students (by different than self-reported measures), show it as a potential advantage, but most of all, teach all students safe strategies for coping with stress regardless of their stress resistance level.

Regarding sociocultural determinants, the image and perception of entrepreneurship, it is important to highlight that when students perceive entrepreneurship as a way to achieve high income as well as a source of prestige and recognition, it increases the chances of them having higher growth aspirations. These variables are important and may be highly contextual as their impact and significance might differ in different countries (representing diverse cultures and images of entrepreneurs). Therefore, the context of this study adds novelty to the topic. However, most importantly they should be treated with caution as their impact especially on young or aspiring entrepreneurs might be twofold. In other words, raising or confirming these perceptions (of higher income and prestige) without educating about associated risks and consequences might bring more harm than good. Therefore, I advise focusing on these aspects of sociocultural determinants to foster growth aspirations while at the same time consciously educating about potential dangers.

This study is certainly not free from limitations. First of all, I was able to conduct the study in one region of a single country. Therefore, the findings cannot be used for general conclusions. However, the sample size was quite big and based on the universities from the same region (northern Poland), thus making it representative locally at least to some extent. Secondly, the data availability was somewhat limited, and that resulted in a reduced number of predictors used in the models. Another limitation was the fact of using self-reported measures, *i.e.* declarative resistance to stress. Self-reported measures are usually less accurate and prone to biases. Furthermore, I used a general measure of entrepreneurial self-efficacy and a more specific and contextual type could probably yield different results. It should be considered as both a limitation and a potential new research path. Finally, I administered the survey via traditional pen and paper form, which made it impossible to randomise the questions.

However, I believe that the article contributes to a better understanding of the growth aspirations and offers valuable insights into its predictors. Future research avenues could include: finding more antecedents of growth aspiration, testing the model on different group of respondents (*e.g.* active entrepreneurs), investigating different regional contexts as well as sociocultural predictors and incorporating different statistical methods. Moreover, judging from the literature review, I assert that the field requires either a clear distinction or a consensus on definition regarding the terms 'growth intentions' and 'growth aspirations.' With this regard, I propose to make a clear distinction between actual actions aimed at achieving growth and the hypothetical ones.

REFERENCES

Abbasianchavari, A., & Moritz, A. (2021). The impact of role models on entrepreneurial intentions and behavior: a review of the literature. *Management Review Quarterly*, *71*(1), 1-40. https://doi.org/10.1007/s11301-019-00179-0

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179-211. https://doi.org/10.1016/0749-5978(91)90020-T

Ajzen, I. (2011). The theory of planned behaviour: Reactions and reflections. *Psychology & Health*, *26*(9), 1113-1127. https://doi.org/10.1080/08870446.2011.613995

Ajzen, I. (2020). The theory of planned behavior: Frequently asked questions. *Human Behavior and Emerging Technologies, 2*(4), 314-324. https://doi.org/10.1002/hbe2.195

Ali, R.S. (2018). Determinants of female entrepreneurs growth intentions: A case of female-owned small businesses in Ghana's tourism sector. *Journal of Small Business and Enterprise Development*, *25*(3), 387-404. https://doi.org/10.1108/JSBED-02-2017-0057

Anderson, A.R., & Jack, S.L. (2000). The Production of Prestige. *The International Journal of Entrepreneurship and Innovation*, *1*(1), 45-56. https://doi.org/10.5367/000000000101298504

Arshad, M., Farooq, M., Atif, M., & Farooq, O. (2020). A motivational theory perspective on entrepreneurial intentions: a gender comparative study. *Gender in Management*, *36*(2), 221-240. https://doi.org/10.1108/GM-12-2019-0253

Austin, M.J., & Nauta, M.M. (2016). Entrepreneurial Role-Model Exposure, Self-Efficacy, and Women's Entrepreneurial Intentions. *Journal of Career Development*, *43*(3), 260-272. https://doi.org/10.1177/0894845315597475

Ayodele, T.O., Babalola, M.O., Kajimo-Shakantu, K., Olaoye, O.W., & Lawale, R. (2020). Entrepreneurial intentions of real estate students: an ordinal analysis of the predictors. *Journal of Facilities Management*, *19*(1), 53-79. https://doi.org/10.1108/JFM-07-2020-0048

BarNir, A. (2021). To Venture or Not to Venture? Gender Stereotyping and Women's Entrepreneurial Aspirations. *Sex Roles*, *85*, 57-72. https://doi.org/10.1007/s11199-020-01204-3

Baumol, W.J. (1996). Entrepreneurship: Productive, unproductive, and destructive. *Journal of Business Venturing*, *11*(1), 3-22. https://doi.org/10.1016/0883-9026(94)00014-X

Belso Martínez, J.A. (2005). Equilibrium entrepreneurship rate, economic development and growth. Evidence from Spanish regions. *Entrepreneurship & Regional Development*, *17*(2), 145-161. https://doi.org/10.1080/08985620500032633

Bindewald, A. (2004). Unternehmensinsolvenzen in Deutschland und ihre Bedeutung für die volkswirtschaftliche Entwicklung. *Was Erfolgreiche Unternehmen Ausmacht*, 1-13. https://doi.org/10.1007/978-3-7908-2714-9_1

Bosma, N., Hessels, J., Schutjens, V., Praag, M.V., & Verheul, I. (2012). Entrepreneurship and role models. *Journal of Economic Psychology*, *33*(2), 410-424. https://doi.org/10.1016/j.joep.2011.03.004

Bogaert, S., Bosma, N., Edwards, N., Jaspers, F., Jong, J. de, Stam, E., & Witteloostuijn, A. van. (2011). *Ambitious Entrepreneurship. A Review of the State of the Art*. VRWI / AWT. Retrieved from https://research.tilburguniversity.edu/en/publications/ambitious-entrepreneurship-a-review-of-the-state-of-the-art on June 1, 2023.

Boutaleb, F. (2023). Global Entrepreneurship Monitor 2022/2023 Global Report Adapting to a "New Normal", *GEM*, London.

Boyd, N.G., & Vozikis, G.S. (1994). The Influence of Self-Efficacy on the Development of Entrepreneurial Intentions and Actions. *Entrepreneurship Theory and Practice*, *18*, 63-77. https://doi.org/10.1080/02640410152475847

Bulanova, O., Isaksen, E.J., & Kolvereid, L. (2016). Growth aspirations among women entrepreneurs in high growth firms. *Baltic Journal of Management*, *11*(2), 187-206. https://doi.org/10.1108/BJM-11-2014-0204

Byrne, M.J., & Fayolle, A. (2013). Necessity entrepreneurs in France: women and business support services. *Female Entrepreneurship and the New Venture Creation: An International Overview, Routledge, New York and London*.

Capelleras, J.L., Contin-Pilart, I., Larraza-Kintana, M., & Martin-Sanchez, V. (2019). Entrepreneurs' human capital and growth aspirations: the moderating role of regional entrepreneurial culture. *Small Business Economics*, *52*(1), 3-25. https://doi.org/10.1007/s11187-017-9985-0

Cardella, G.M., Hernández-Sánchez, B.R., & Sánchez García, J.C. (2020). Entrepreneurship and Family Role: A Systematic Review of a Growing Research. *Frontiers in Psychology*, *10*, 2939.

Carr, J.C., & Sequeira, J.M. (2007). Prior family business exposure as intergenerational influence and entrepreneurial intent: A Theory of Planned Behavior approach. *Journal of Business Research*, *60*(10), 1090-1098. https://doi.org/10.1016/j.jbusres.2006.12.016

Carree, M., Van Stel, A., Thurik, R., & Wennekers, S. (2007). The relationship between economic development and business ownership revisited. *Entrepreneurship & Regional Development*, *19*(3), 281-291. https://doi.org/10.1080/08985620701296318

Chan, C.K.Y., Yeung, N.C.J., Kutnick, P., & Chan, R.Y.Y. (2019). Students' perceptions of engineers: dimensionality and influences on career aspiration in engineering. *International Journal of Technology and Design Education*, *29*(3), 421-439. https://doi.org/10.1007/S10798-018-09492-3/FIGURES/1

Constant, A., & Shachmurove, Y. (2006). Entrepreneurial ventures and wage differentials between Germans and immigrants. *International Journal of Manpower*, *27*(3), 208-229. https://doi.org/10.1108/01437720610672149/FULL/XML

Constant, A., & Zimmermann, K.F. (2006). The making of entrepreneurs in Germany: Are native men and immigrants alike?. *Small Business Economics*, *26*(3), 279-300. https://doi.org/10.1007/S11187-005-3004-6/METRICS

Davis, A.E., & Shaver, K.G. (2012). Understanding Gendered Variations in Business Growth Intentions Across the Life Course. *Entrepreneurship: Theory and Practice*, *36*(3), 495-512. https://doi.org/10.1111/j.1540-6520.2012.00508.x

Delmar, F., & Wiklund, J. (2008). The Effect of Small Business Managers' Growth Motivation on Firm Growth: A Longitudinal Study. *Entrepreneurship Theory and Practice*, *32*(3), 437-457. https://doi.org/10.1111/j.1540-6520.2008.00235.x

Douglas, E.J. (2013). Reconstructing entrepreneurial intentions to identify predisposition for growth. *Journal of Business Venturing*, *28*(5), 633-651. https://doi.org/10.1016/j.jbusvent.2012.07.005

Dutta, D.K., & Thornhill, S. (2008). The evolution of growth intentions: Toward a cognition-based model. *Journal of Business Venturing*, *23*(3), 307-332. https://doi.org/10.1016/j.jbusvent.2007.02.003

Efendic, A., Mickiewicz, T., & Rebmann, A. (2014). Growth aspirations and social capital: Young firms in a post-conflict environment. *International Small Business Journal*, *33*(5), 537-561. https://doi.org/10.1177/0266242613516987

Estrin, S., Korosteleva, J., & Mickiewicz, T. (2022). Schumpeterian Entry: Innovation, Exporting, and Growth Aspirations of Entrepreneurs. *Entrepreneurship Theory and Practice*, *46*(2), 269-296. https://doi.org/10.1177/1042258720909771

Fahed-Sreih, J., Pistrui, D., Huang, W., & Welsch, H. (2009). Family contributions to entrepreneurial development in Lebanon. *International Journal of Organizational Analysis*, *17*(3), 248-261. https://doi.org/10.1108/19348830910974941

Fellnhofer, K. (2017). The Power of Passion in Entrepreneurship Education: Entrepreneurial Role Models Encourage Passion? *Journal of Entrepreneurship Education*, *20*(1), 58-87.

Gancarczyk, M. (2019). The Performance of High-Growers and Regional Entrepreneurial Ecosystems: A Research Framework. *Entrepreneurial Business and Economics Review*, *7*(3), 99-123. https://doi.org/10.15678/EBER.2019.070306

Georgescu, M.A., & Herman, E. (2020). The Impact of the Family Background on Students' Entrepreneurial Intentions: An Empirical Analysis. *Sustainability*, *12*(11). https://doi.org/10.3390/su12114775

Giannetti, M., & Simonov, A. (2003). Does Prestige Matter More than Profits? Evidence from Entrepreneurial Choice, No 4157, *CEPR Discussion Papers, C.E.P.R. Discussion Papers*, Retrieved from https://EconPapers.repec.org/RePEc:cpr:ceprdp:4157 on May 2, 2023.

Gruenwald, R.K. (2013). Entrepreneurship Challenges in High-Growth Companies and Consequences for SME Policy. *Entrepreneurial Business and Economics Review*, *1*(1), 41-54. https://doi.org/10.15678/EBER.2013.010104

Hechavarria, D.M., Schenkel, M.T., & Matthews, C.H. (2009). Contextual motivation and growth aspirations among nascent entrepreneurs. In *New Firm Creation in the United States* (pp. 35-49). Springer.

Henrekson, M. (2005). Entrepreneurship: a weak link in the welfare state?. *Industrial and Corporate Change*, *14*(3), 437-467. https://doi.org/10.1093/icc/dth060

Hurst, E., & Pugsley, B., (2011), What Do Small Businesses Do?, No 17041, *NBER Working Papers, National Bureau of Economic Research*, Inc. Retrieved from https://EconPapers.repec.org/RePEc:nbr:nberwo:17041 on May 2, 2023.

Johnston, R., Jones, K., & Manley, D. (2018). Confounding and collinearity in regression analysis: a cautionary tale and an alternative procedure, illustrated by studies of British voting behaviour. *Quality and Quantity, 52*(4), 1957-1976. https://doi.org/10.1007/s11135-017-0584-6

Karimi, S., Biemans, H.J., Lans, T., Chizari, M., & Mulder, M. (2014). Effects of role models and gender on students' entrepreneurial intentions. *European Journal of Training and Development*, *38*(8), 694-727. https://doi.org/10.1108/EJTD-03-2013-0036

Kaur, R., & Bawa, S. (1999). Psychological Correlates of Entrepreneurial Performance among Women. *The Journal of Entrepreneurship*, *8*(2), 195-205. https://doi.org/10.1177/097135579900800204

Kolvereid, L. (1992). Growth aspirations among Norwegian entrepreneurs. *Journal of Business Venturing*, *7*(3), 209-222.

Kolvereid, L., & Bullvag, E. (1996). Growth intentions and actual growth: The impact of entrepreneurial choice. *Journal of Enterprising Culture*, *4*(01), 1-17.

Kolvereid, L., & Isaksen, E.J. (2017). Expectations and achievements in new firms. *Journal of Small Business and Enterprise Development*, *24*(3), 649-668. https://doi.org/10.1108/JSBED-11-2016-0189/FULL/XML

Kontogiannis, N., Litina, A., & Varvarigos, D. (2019). Occupation-induced status, social norms, and economic growth. *Journal of Economic Behavior & Organization*, *163*, 348-360. https://doi.org/10.1016/J.JEBO.2019.04.027

Laviolette, E.M., Lefebvre, M.R., & Brunel, O. (2012). The impact of story bound entrepreneurial role models on self-efficacy and entrepreneurial intention. *International Journal of Entrepreneurial Behaviour and Research*, *18*(6), 720-742. https://doi.org/10.1108/13552551211268148

Levie, J.,& Autio, E., (2013), Growth and growth intentions: a meta-analysis of existing evidence, No 0001, *White Papers, Enterprise Research Centre*. Retrieved from https://EconPapers.repec.org/RePEc:enr:wpaper:0001 on May 2, 2023.

Liguori, E.W., Bendickson, J.S., & McDowell, W.C. (2018). Revisiting entrepreneurial intentions: a social cognitive career theory approach. *International Entrepreneurship and Management Journal*, *14*(1), 67-78. https://doi.org/10.1007/S11365-017-0462-7/METRICS

Manolova, T.S., Brush, C.G., Edelman, L.F., & Shaver, K.G. (2012). One size does not fit all: Entrepreneurial expectancies and growth intentions of US women and men nascent entrepreneurs. *Entrepreneurship & Regional Development*, *24*(1-2), 7-27. https://doi.org/10.1080/08985626.2012.637344

McKelvie, A., Brattström, A., & Wennberg, K. (2017). How young firms achieve growth: reconciling the roles of growth motivation and innovative activities. *Small Business Economics*, *49*(2), 273-293. https://doi.org/10.1007/S11187-017-9847-9/TABLES/7

Meoli, A., Fini, R., Sobrero, M., & Wiklund, J. (2020). How entrepreneurial intentions influence entrepreneurial career choices: The moderating influence of social context. *Journal of Business Venturing*, *35*(3), 105982. https://doi.org/10.1016/J.JBUSVENT.2019.105982

Muñoz-Bullón, F., Sanchez-Bueno, M.J., & Nordqvist, M. (2020). Growth intentions in family-based new venture teams: The role of the nascent entrepreneur's R&D behavior. *Management Decision*, *58*(6), 1190-1209. https://doi.org/10.1108/MD-08-2018-0942

Murphy, L., & Lambrechts, F. (2015). Investigating the actual career decisions of the next generation: The impact of family business involvement. *Journal of Family Business Strategy*, *6*(1), 33-44. https://doi.org/10.1016/j.jfbs.2014.10.003

Ng, K.S., & Fu, P.P. (2018). Factors Driving Foreign Women Entrepreneurship in China. *Entrepreneurial Business and Economics Review*, *6*(4), 49-69. https://doi.org/10.15678/EBER.2018.060403

Nowiński, W., & Haddoud, M.Y. (2019). The role of inspiring role models in enhancing entrepreneurial intention. *Journal of Business Research*, *96*, 183-193. https://doi.org/10.1016/j.jbusres.2018.11.005

Puente, R., Cervilla, M.A., González, C.G., & Auletta, N. (2017). Determinants of the growth aspiration: a quantitative study of Venezuelan entrepreneurs. *Small Business Economics*, *48*(3), 699-726. https://doi.org/10.1007/S11187-016-9791-0/FIGURES/5

Scherer, R.F., Adams, J.S., Carley, S.S., & Wiebe, F.A. (1989). Role Model Performance Effects on Development of Entrepreneurial Career Preference. *Entrepreneurship Theory and Practice*, *13*(3), 53-72. https://doi.org/10.1177/104225878901300306

Shapero, A., & Sokol, L. (1982). The Social Dimensions of Entrepreneurship. In C.A. Kent, D.L. Sexton, & K.H. Vesper (Eds.). *Encyclopedia of Entrepreneurship* (pp. 72-90). Englewood Cliffs, NJ: Prentice-Hall.

Shepherd, D., & Wiklund, J. (2009). Are we Comparing Apples with Apples or Apples with Oranges? Appropriateness of Knowledge Accumulation across Growth Studies. *Entrepreneurship Theory and Practice*, *33*(1), 105-123. https://doi.org/10.1111/J.1540-6520.2008.00282.X

Siepel, J., Cowling, M., Coad, A., & Drivers, L. (2015). Entrepreneurial Growth: Individual, Firm, and Region Article information: Advances in Entrepreneurship. *Firm Emergence and Growth*, 320.

Širec, K., Tominc, P., & Rebernik, M. (2010). "Chapter 17: Gender Differences in the Growth Aspirations and Technology Orientation of Slovenian Entrepreneurs". *In Women Entrepreneurs and the Global Environment for Growth*. Cheltenham, UK: Edward Elgar Publishing. https://doi.org/10.4337/9781849806633.00023

Stam, E., Bosma, N., Van Witteloostuijn, A., De Jong, J., Bogaert, S., Edwards, N., & Jaspers, F. (2012). Ambitious entrepreneurship. A Review of the Academic Literature and New Directions for Public Policy, *Report for the Advisory Council for Science and Technology Policy (AWT) and the Flemish Council for Science and Innovation (VRWI)*.

Stenholm, P. (2011). Innovative Behavior as a Moderator of Growth Intentions. *Journal of Small Business Management*, *49*(2), 233-251.

Thornton, P.H., Ribeiro-Soriano, D., & Urbano, D. (2011). Socio-cultural factors and entrepreneurial activity. *International Small Business Journal*, *29*(2), 105-118. https://doi.org/10.1177/0266242610391930

Tominc, P., & Rebernik, M. (2007a). Gender differences in early-stage entrepreneurship in three european post-socialist countries. *Drustvena Istrazivanja*, *16*(3), 589-611.

Tominc, P., & Rebernik, M. (2007b). Growth aspirations and cultural support for entrepreneurship: A comparison of post-socialist countries. *Small Business Economics*, *28*(2-3), 239-255. https://doi.org/10.1007/s11187-006-9018-x

Uansa-Ard, S., & Wannamakok, W. (2022). University students' entrepreneurial intentions during COVID-19: The perspective of social cognitive career theory. *Journal of Entrepreneurship, Management and Innovation*, *18*(3), 75-105. https://doi.org/10.7341/20221833

Udayanan, P. (2019). The role of self-efficacy and entrepreneurial self-efficacy on the entrepreneurial intentions of graduate students: A study among omani graduates. *Entrepreneurial Business and Economics Review*, *7*(4), 7-20. https://doi.org/10.15678/EBER.2019.070401

Venugopal, V. (2016). Investigating women's intentions for entrepreneurial growth. *International Journal of Gender and Entrepreneurship*, *8*(1), 2-27. https://doi.org/10.1108/IJGE-11-2014-0043

Wang, D., Wang, L., & Chen, L. (2018). Unlocking the influence of family business exposure on entrepreneurial intentions. *International Entrepreneurship and Management Journal*, *14*(4), 951-974. https://doi.org/10.1007/s11365-017-0475-2

Wang, J., Li, Y., & Long, D. (2019). Gender gap in entrepreneurial growth ambition: The role of culturally contingent perceptions of the institutional environment in China. *International Journal of Entrepreneurial Behaviour and Research*, *25*(6), 1283-1307. https://doi.org/10.1108/IJEBR-04-2018-0248

Wennekers, S., & Thurik, R. (1999). Linking Entrepreneurship and Economic Growth. *Small Business Economics, 13*, 27-56 https://doi.org/10.1023/A:1008063200484

Wiklund, J., & Shepherd, D. (2003). Aspiring for, and Achieving Growth: The Moderating Role of Resources and Opportunities*. *Journal of Management Studies*, *40*(8), 1919-1941. https://doi.org/https://doi.org/10.1046/j.1467-6486.2003.00406.x

Zellweger, T., Sieger, P., & Halter, F. (2011). Should I stay or should I go? Career choice intentions of students with family business background. *Journal of Business Venturing*, *26*(5), 521-536. https://doi.org/10.1016/j.jbusvent.2010.04.001

Zięba, K., & Golik, J. (2018). Testing Students' Entrepreneurial Self-Efficacy as an Early Predictor of Entrepreneurial Activities. Evidence from the SEAS Project. *Journal of Entrepreneurship Management and Innovation*, *14*(1), 91-107. https://doi.org/10.7341/20181415

Ziemiański, P., & Golik, J. (2020). Including the Dark Side of Entrepreneurship in the Entrepreneurship Education. *Education Sciences* 2020, *10*(8), 211. https://doi.org/10.3390/EDUCSCI10080211

Zozimo, R., Jack, S., & Hamilton, E. (2017). Entrepreneurial learning from observing role models. *Entrepreneurship & Regional Development*, *29*(9-10), 889-911. https://doi.org/10.1080/08985626.2017.1376518

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Acknowledgements and Financial Disclosure

The author would like to thank the anonymous referees for their useful comments, which allowed to increase the value of this article.

Conflict of Interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Published by Krakow University of Economics – Krakow, Poland

Ministry of Education and Science
Republic of Poland

The journal is co-financed in the years 2022-2024 by the Ministry of Education and Science of the Republic of Poland in the framework of the ministerial programme "Development of Scientific Journals" (RCN) on the basis of contract no. RCN/SP/0583/2021/1 concluded on 13 October 2022 and being in force until 13 October 2024.

Entrepreneurial Business and Economics Review

2024, Vol. 12, No. 2

10.15678/EBER.2024.120205

The role of entrepreneurial intention in the institution and entrepreneurial activity linkage: Cross-country evidence

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ABSTRACT

Objective: The objective of the article is to integrate the theory of planned behaviour (TPB) to argue that entrepreneurial intention plays a moderating role in the relationship between institutions and entrepreneurial activity.

Research Design & Methods: The article uses panel data analysis conducted on a sample of 112 countries from 2001 to 2021, using data from the Global Entrepreneurship Monitor. Various panel regression techniques estimate the total early-stage entrepreneurial activity (TEA) conditional upon institutions and entrepreneurial intention.

Findings: The study found evidence of moderating effects of entrepreneurial intention in the institution and entrepreneurial activity linkage. Results revealed a negative impact of institutions on total entrepreneurial activity, with pre-existing entrepreneurial intention at the country level mitigating this impact by 4% to 50%, depending on institution dimensions. Notably, the moderating effect of entrepreneurial intention weakens over time, lasting up to two years.

Implications & Recommendations: To promote entrepreneurship, policymakers should prioritize initiatives that nurture and shape entrepreneurial intention, recognizing that the moderating effect of entrepreneurial intention weakens over time.

Contribution & Value Added: This article is the first attempt to consider entrepreneurial intention as a key construct to examine the potential moderating mechanisms between institutions and entrepreneurship, drawing on the TPB. The study uncovers a new role of entrepreneurial intention in navigating the institutional context for entrepreneurial activity.

Article type:	research article
Keywords:	institutions; entrepreneurship; entrepreneurial intention; theory of planned behaviour; GEM data
JEL codes:	D02, L26, O43

Received: 3 August 2023 Revised: 8 December 2023 Accepted: 4 January 2024

Suggested citation:
Pham, T.T.T, Ha, T.C.V., & Nguyen, D. (2024). The role of entrepreneurial intention in the institution and entrepreneurial activity linkage: Cross-country evidence. *Entrepreneurial Business and Economics Review,* 12(2), 79-96. https://doi.org/10.15678/EBER.2024.120205

INTRODUCTION

Formal and informal institutional environments are integral to economic development and business formation (Chowdhury *et al*., 2019). Formal institutions encompass the legislative, political, and economic structures of a country, while informal institutions consist of norms, customs, traditions, and culture. Countries with well-developed institutional systems generally exhibit higher levels of entrepreneurial activity due to the incentives and legal frameworks they provide for businesses. In contrast, weak institutions tend to encourage individuals or firms to exploit political or legal processes for competitive advantage, leading to unproductive entrepreneurship (Baumol, 1996; Sobel, 2008). Extensive evidence confirms the positive relationship between formal institutions and entrepreneurial activity, highlighting institutions as a key driver of entrepreneurial success across countries (Baumol, 1996; Bosma *et al*., 2018; Chambers & Munemo, 2019; Chowdhury *et al.*, 2019; Hanoteau & Vial, 2020; Khyareh, 2023; Sobel, 2008). However, there is also evidence suggesting a negative

relationship between strong institutions and entrepreneurial activity, influenced by factors such as stringent regulatory requirements (Miao *et al.*, 2022), fiscal freedom linked to reduced necessity entrepreneurship (Nikolaev *et al*., 2018), and the observation that corruption appears to facilitate entrepreneurial activity in adverse investment climates (Dutta & Sobel, 2016).

The relationship between institutions and entrepreneurship is complex (Salimath & Cullen, 2010) and often studied through the lens of average entrepreneurial rates across countries. However, to better understand the impact of institutions on entrepreneurship, it is essential to consider additional factors. Lv *et al*. (2021) highlighted the significance of entrepreneurship distribution, showing that countries with varying levels of entrepreneurship may respond differently. Heterogeneous impacts also arise from moderator variables influencing the institution-entrepreneurship linkage, an aspect often overlooked in current research. Exceptions, like Miao *et al.* (2022), found religiosity moderating government effectiveness's influence on political freedom, affecting the relationship with entrepreneurship. Anokhin and Schulze (2009) revealed that foreign direct investment (FDI) can moderate corruption's link to entrepreneurial activity. As entrepreneurial activity is very much an individual endeavour, psychological factors such as spirit and intention likely shape institutions' effects on entrepreneurship. Countries with differing entrepreneurial spirits and intention levels may significantly differ in their responses to institutional factors that either stimulate or hinder entrepreneurship. Entrepreneurial activities are considered a long-term process with entrepreneurial intention serving as an initial step (Krueger, 1993). The theory of planned behaviour (TPB) asserts that entrepreneurial intention plays a crucial role in determining entrepreneurial outcomes, as it drives proactive commitments and plans necessary for the entrepreneurial journey (Radipere & Ladzani, 2014). These commitments and behaviours enable nascent entrepreneurs to overcome challenges and barriers posed by contextual factors such as institutions, market competition, and technological dynamics. To the best of our knowledge, no studies have investigated the potential moderating role of entrepreneurial intention in the relationship between institutions and entrepreneurial activity.

We aimed to investigate the relationship between formal institutional factors and entrepreneurial activity with a specific focus on the role of entrepreneurial intention in shaping this relationship. Using panel data analysis from 2001 to 2021 across 112 countries with data from reputable secondary sources, this study explores how entrepreneurial intention moderates the influence of institutions on entrepreneurial activity at the country level. It examines the duration of these moderating effects and how they evolve considering specific contexts where the role of entrepreneurial intention is more prominent. Drawing on the TPB, we hypothesize that pre-existing entrepreneurial intention can serve as a buffer, alleviating institutional challenges, or as an enabler, leveraging the positive impact of institutions.

This study offers three key contributions to the existing entrepreneurship literature. Firstly, it investigates the influence of prior entrepreneurial intention on the institution-entrepreneurship linkage, extending beyond previous research on intention determinants. While existing literature has examined a few moderating factors, such as religiosity (Miao *et al*., 2022) and FDI (Anokhin & Schulze, 2009), this research provides novel insights by examining how entrepreneurial intention translates into action, interacting with institutional factors to drive entrepreneurial outcomes. Secondly, it enhances our understanding of the complex relationship between institutions and entrepreneurship, highlighting the role of multiple factors in shaping their impact. This nuanced understanding has important policy implications, emphasizing the need for initiatives addressing both formal institutions and entrepreneurial intention to promote entrepreneurship globally. Lastly, the study integrates theoretical foundations from the TPB, adopting a holistic approach to examining entrepreneurship outcomes on a global scale.

The subsequent section provides a comprehensive review of the interplay between institutions, entrepreneurship, and entrepreneurial intention within the framework of the TPB. Section 3 introduces the data sources employed in our analysis and outlines the empirical strategies adopted. This is followed by a detailed discussion of the results in Section 4. Finally, Section 5 concludes the paper by presenting policy implications derived from the findings and suggesting avenues for future research in this domain.

Literature Review and Hypothesis Development

The existing body of literature has consistently emphasized the significance of institutional factors in shaping entrepreneurial activity. Institutions play a crucial role in establishing and enforcing the 'rule of the game' (Busse & Hefeker, 2007; North, 1990), both through formal and informal mechanisms, which in turn influence entrepreneurs' behaviours by incentivizing certain activities and discouraging others (North, 1990). Institutions monitor individuals' attitudes (Fuentelsaz *et al*., 2015) and provide regulatory frameworks, policies, and incentives to guide entrepreneurial activities, foster new business formation, and facilitate economic interactions (North, 1990). Within the context of entrepreneurship and innovation endeavours, in this article, we focus on formal institutions, which, in the existing research, commonly capture six dimensions: government effectiveness, rule of law, political stability, voice and accountability, regulatory quality, and control of corruption (Friedman, 2011).

Competing theoretical views exist on the significance of institutions for business creation and entrepreneurial activity. According to Pigou's public interest theory, regulations aim to protect the public by addressing market failures and ensuring product quality for overall public welfare. Institutions, in this context, distinguish 'bad' entrepreneurs from 'good' ones, providing fair conditions and promoting welfare gains (Audretsch *et al*., 2019). Strong, inclusive institutions with clear, trustworthy regulatory frameworks support a well-functioning business environment, enabling smoother business formation and entrepreneurial activity (Baumol, 1996; Dau & Cuervo-Cazurra, 2014; Sobel, 2008). These institutions exhibit traits such as low bureaucracy, transparency, and minimal corruption, which encourage the establishment of new businesses, investments, and innovation (Fu *et al*., 2020; Urbano *et al*., 2019; Dau & Cuervo-Cazurra, 2014). Conversely, bureaucratic systems with high entry costs discourage individuals from initiating start-ups (Nyström, 2008). A corrupt environment and weak property protection impede the dissemination of information, increase transaction costs, and hinder entrepreneurship (Fogel *et al*., 2006). In this sense, institutions appear to have a positive impact on business formation and entrepreneurial activity.

The literature also presents counterarguments to the relationship between institutions and entrepreneurial activity, as navigated by the public choice theory (Audretsch *et al*., 2019; Djankovet *et al*., 2002; Peltzman, 1976; Tullock, 1967). The public choice theory argues that regulation, as socially inefficient, stems from two strands. Stigler's argument asserts that regulations are often acquired by industries for their benefit, acting as barriers to entry, excluding competitors and boosting profits for established players (Stigler, 2021; Djankov *et al*., 2002; Tullock, 1967). The second strand suggests that regulations are exploited by powerful politicians for personal economic gains, creating opportunities for corruption (Audretsch *et al*., 2019; Djankov *et al*., 2002; De Soto, 1989). Complex regulations can lead to direct revenues and corruption opportunities for politicians, potentially diminishing firms' profitability (Wood *et al.*, 2016). In environments, where bribery can help 'grease' the business wheel (Dutta & Sobel, 2016), strengthening institutions for less corruption may create tough barriers to new business entry (Friedman, 2011; Miao *et al*., 2022), particularly evident in emerging economies (Chowdhury *et al*., 2015). The existing literature provides a thorough documentation of these negative impacts notably associated with strong regulations and corruption control (Miao *et al*., 2022; Audretsch *et al*., 2019; Chambers & Munemo, 2019; Djankov *et al*., 2002).

Existing evidence supports the positive relationship between institutions and entrepreneurship across various dimensions. Chambers and Munemo (2019) observed low start-up rates in countries with excessive barriers to entry and low institutional quality. Nyström (2008) found a 1.2% increase in self-employment rates for each one-unit improvement in the institutional quality index in OECD countries. Dean and Brown (1995) associated increased paperwork and procedures for business start-ups with reduced new business formation. Political stability and freedom have been shown to foster private investment, entrepreneurship, and business formation (Audretsch & Fiedler, 2021; Dutta & Sobel, 2016; Feng, 2001; Munemo, 2012). Furthermore, better control of corruption has been linked to increased innovation and entrepreneurial activity globally (Anokhin & Schulze, 2009; Bowen & Clercq, 2008; Khyareh, 2017). To a lesser extent, several empirical studies confirm the negative link between

institutions and entrepreneurship, using country-level data across Europe or worldwide (Chambers & Munemo, 2019; Friedman, 2011; Miao *et al.*, 2022) or firm-level data in the US (Wood *et al*., 2016). A U-shaped relationship between business regulations and entrepreneurship is found in cross-sectional data from developed and selected countries (Djankov *et al*., 2002). Interestingly, recent research by Khalilov and Yi (2021) revealed a two-way causal relationship between institutions and entrepreneurship: the regulatory environment fosters entrepreneurial activity, and entrepreneurship, as institutional entrepreneurs, shapes and modifies the regulatory dimension of institutions.

Given the contrasting perspectives within existing theories regarding the impact of institutions on entrepreneurship and the inconclusive evidence, we sought to re-examine the influence of institutional factors on entrepreneurial activity for a global sample of 112 countries.

H1: Institutional factors impact (positively or negatively) entrepreneurial activity.

Indeed, the relationship between institutions and entrepreneurship is complex, influenced by competing theoretical arguments and contextual factors that can either strengthen or moderate their effects. Understanding moderation effects helps provide insights into the differentiated impact of institutions on entrepreneurial activity. However, existing entrepreneurship literature has largely overlooked moderation effects. One exception is the study by Miao *et al*. (2022), who found that religiosity moderates the relationship between government effectiveness and political freedom, affecting total entrepreneurial activities. Religiosity influences human behaviour and decision-making, leading individuals to connect their personal and professional decisions with their religion. Another study by Anokhin and Schulze (2009) demonstrated that the positive relationship between corruption and entrepreneurial innovation activities is moderated by the level of FDI inflow. They argue that corruption affects the type of FDI and reduces technology spill-overs, resulting in limited technology investment in corrupt countries.

In this article, we examined how institutions affect entrepreneurship, focusing on moderating effects. We argued that entrepreneurial intention, a critical factor in entrepreneurial decisions, played a significant moderating role in shaping the influence of institutional factors on entrepreneurial activity.

The theory of planned behaviour (TPB), proposed by Ajzen (1991), asserts the significance of entrepreneurial intention in shaping the influence of institutions on entrepreneurial activity. According to TPB, intention revolves around action plans and encompasses motivational factors that drive specific behaviours. Motivational factors indicate an individual's willingness to attempt and the effort exerted to engage in the behaviour (Ajzen, 1991). Previous entrepreneurship research has demonstrated that starting and growing a business, as well as other entrepreneurship-related behaviours, are all planned behaviours, and many of these behaviours are rooted in entrepreneurial intention (Kolvereid & Isaksen, 2006; Krueger Jr *et al.*, 2000.). Entrepreneurial intention refers to 'the intention to start a new business' and serves as the initial step in the long-term entrepreneurial process. Previous studies have extensively explored entrepreneurial intention's key antecedents across various dimensions, emphasizing cognitive factors like self-efficacy (Zhao *et al*., 2005) and outcome expectations (Krueger *et al*., 2000). Farashah's (2015) social-cognitive model reveals that, in addition to cognitive and demographic factors, country-level institutional conditions play an important role in fostering entrepreneurial intention. De Pillis and Reardon (2007) and Krueger *et al.* (2000) concluded that intentions are the most reliable predictor of planned behaviours, including entrepreneurship, while Kautonen *et al.* (2013) confirmed a causal relationship between the intention to engage in business and specific actions undertaken for venture preparation.

The TPB posits that when an entrepreneur possesses the intention to engage in entrepreneurial activities, it drives a thorough planning process (Davila *et al.*, 2006), instils confidence, and fosters proactive commitment towards achieving success (Bandura, 2001). Launching a start-up is a process consisting of exploring business ideas and turning an entrepreneurial opportunity into a reality. The start-up process is therefore risky and easily fails. Many entrepreneurs make the decision to start a business long before they delve into entrepreneurial opportunities (Krueger, 2000). Throughout this long-term process, various contextual factors, including institutions, industry competition, technological dynamics, and other external elements, pose challenges that entrepreneurs must overcome. In this context, entrepreneurial intention drives effective planning, resource allocation, and the ac-

quisition of necessary expertise to surmount barriers hindering entrepreneurial activities (Andriopoulos, 2003). Bandura (2001) argues that entrepreneurial intention is not merely an anticipation of future behaviour. Rather, it signifies a proactive commitment involving significant time investment, extensive planning, and extensive cognitive processing to bring it into fruition. While Farashah (2015) and Khalilov and Yi (2021) acknowledged the influence of institutional factors in shaping entrepreneurial intention, it is essential to highlight that entrepreneurial intention likely interacts with these institutional factors to drive entrepreneurial activity.

In an environment characterized by institutional obstacles to entrepreneurial activity, such as rigorous requirements and time-consuming administrative processes, the role of entrepreneurial intention becomes more critical. Nascent entrepreneurs with strong entrepreneurial intentions exhibit greater persistence and strategic planning, enabling them to overcome institutional challenges and realize their entrepreneurial endeavours.

Overall, supportive institutions provide aspiring entrepreneurs with resources for successful business establishment and growth. For entrepreneurs with strong entrepreneurial intentions, the positive association between institutions and entrepreneurial activity becomes stronger. Moreover, entrepreneurs with strong entrepreneurial intentions are better equipped to overcome institutional challenges and achieve entrepreneurial outcomes. Based on this discussion, we formulated the following hypothesis to test the possible moderating role of entrepreneurial intention.

H2: Entrepreneurial intention strengthens the effects of institutional factors on entrepreneurial activity.

In light of the TPB framework, entrepreneurial intention stands out as a key predictor of entrepreneurial outcomes, supported by existing literature. However, literature has yet to address the influence of entrepreneurial intention on how nascent entrepreneurs navigate the institutional context in their pursuit of entrepreneurial activity. Our study aims to fill this gap in order to shed light on the complex interplay between entrepreneurial intention, institutions, and entrepreneurial endeavours.

Research Methodology

To examine the institution-entrepreneurial activity nexus and the moderating role of entrepreneurial intention, we employed a panel dataset spanning twenty years (2001-2021) and comprising 112 countries. Our data sources include the World Development Indicators (WDI), World Governance Indicators (WGI), Human Development Index (HDI) from UNDP, and the Global Entrepreneurship Monitor (GEM). The Adult Population Surveys within the GEM dataset provide country-level entrepreneurship data aggregated from over 2000 individuals surveyed per country, including information on entrepreneurial activity and intention. The WGI dataset measures institutions across six dimensions, and we construct an average index of these indicators for the countries in our sample.

Our key outcome variable, total early-stage entrepreneurial activity (TEA), represents the percentage of the population aged 18-64 engaged in nascent entrepreneurship or owning new businesses. Table 1 presents the summary statistics of our variables. The range of values for TEA is wide, varying from 1.5% in Japan (2004) to 52.1% in Vanuatu (2010). The institution indicators (GI), representing institutional quality, exhibit considerable variation as well, with values ranging from -1.7 in Sudan (2018) to 1.97 in Finland (2003). Entrepreneurial intention (EI), our moderating variable, is defined as the percentage of the population aged 18-64 who are latent entrepreneurs with the intention to start a business within three years. The distribution of EI is right-skewed, with a median value of 15% across countries. Control variables such as unemployment, trade openness, private credit, and HDI display appropriate skewness and kurtosis values without requiring additional data transformation. We assessed multicollinearity for our main independent variables using a random effects model. As presented in Table 1, the VIF test provides values below 2, indicating no significant multicollinearity.

To explore the possible moderating role of entrepreneurial intention in the institution-entrepreneurial activity linkage, we proposed the following model estimating the TEA conditional upon institutions, entrepreneurial intention, and lagged explanatory variables.

$$tea_{it} = \beta_0 + \beta_1 gi_{it} + \beta_2 ei_{i,t-1} + \beta_3 (gi_{it} * ei_{i,t-1}) + \Theta' X_{it-1} + \eta_i + \mu_t + \epsilon_{it} \quad (1)$$

Subscripts i and t index country and time, in which tea_{it} is the level of total early-stage entrepreneurial activity (TEA); gi_{it} is one of the six institution indicators and its average; ei_{it} is the level of entrepreneurial intention; X_{it} is a vector of control variables; η_i is a time-invariant country-specific effect; μ_t is time-specific effects that capture common time shocks to entrepreneurship; and ϵ_{it} is the usual normally distributed error term. We provide a table of Variable definition in the Appendix Table A1.

To address potential reverse causality between entrepreneurial intention and entrepreneurship, we employed lagged values of entrepreneurial intention (Leszczensky & Wolbring, 2022), considering the time delay between changes in independent variables and their effect on TEA. Lagged values also help mitigate endogeneity issues, as TEA may affect other variables, leading to biased estimates. By incorporating lagged values, we could obtain more reliable estimates of the influence of control variables on TEA.

We included in the analysis selected time-varying control variables that underlie entrepreneurial activity, as suggested by previous studies. For instance, local financial development, represented by domestic credit significantly impacts domestic entrepreneurial activities (Dutta & Meierrieks, 2021; Kerr & Nanda, 2011). Trade openness stimulates business creation in response to increasing demand, as suggested by Herrera-Echeverri *et al.* (2014). Moreover, human capital, measured by human development index, are a crucial determinant of entrepreneurial success (Dutta & Sobel, 2018; Marvel *et al*., 2016). We also included unemployment as an important control variable as suggested by Khalilov and Yi (2021). Lastly, Tsai *et al*. (2016) observed a connection between fear of failure (FFR), perceived opportunity (PO), and entrepreneurial intention in the China and Taiwan GEM samples. By accounting for FFR and PO, we could isolate the relationship between EI and TEA without the confounding influence of FFR and PO on both EI and TEA.

To test the moderating role of entrepreneurial intention, we used the interaction term between lagged entrepreneurial intention and institution indicators in predicting entrepreneurial outcomes. An expected positive coefficient for the interaction term indicates that entrepreneurial intention leverages positive effects and at the same time moderates negative effects of institutional factors on entrepreneurial activity.

To address potential endogeneity concerns associated with institutions, we employed the fixed effects two-stage least squares (2SLS) method. We note that as an aggregate index, TEA represents the percentage of the national population engaged in nascent entrepreneurial activity. Various groups within the national population may participate in TEA in different years. This year's fluctuations in the TEA rate are not contingent on the previous year's rate; instead, they are largely influenced by new groups of entrepreneurs entering TEA and other driving factors. Hence, the TEA variable does not exhibit a lag property and does not require the use of a GMM method. We acknowledge this important point raised by one of the reviewers.

We used General Expenditure Final Consumption from the World Development Indicators (WDI) and Size of Government from Fraser Economic Freedom as instruments for institutions in our fixed effects two-stage least squares (2SLS) model. There exists a clear relationship between government spending and institutions' quality and design (Primo, 2007). Therefore, these variables serve as relevant instruments for our model. It is important to note that this spending does not directly target entrepreneurs, as it is a general-level expenditure for a country. Even if there is an impact, it will be channelled through the institutions and their policies and affect entrepreneurs in the future but not immediately.

Table 2 presents a comparison of the equation (1) model with the pooled ordinary least squares (OLS), random effects, fixed effects, and fixed effects 2SLS models. The significance of the Hausman Chi-squared test in column (2) indicates that a fixed effects model is a better choice than a random effects model. The fixed effects OLS and fixed effects 2SLS models performed similarly among control variables, while the impact of institutions and the entrepreneurial intention's moderating effect was more evident in the latter model. The significance of the F-test indicated that the chosen instruments are relevant, as suggested by the cited literature. The significance of the Wu-Hausman test suggests

that the fixed effects 2SLS model is an improvement in addressing endogeneity. Finally, the non-significance of the Sargan test indicates that the instruments were not correlated with the error terms and hence the model was correctly specified. We employed the fixed effects 2SLS model for the results of equation specifications 1-3 presented in Tables 3-5.

Table 1. Summary statistics

Variables	n	mean	sd	median	min	max	range	skew	kurtosis	se	VIF test
po	1082	42.5	17.4	42.4	2.9	95.4	92.5	0.2	-0.4	0.5	1.12
ffr	1081	35.7	9.7	35.2	7.1	75.4	68.3	0.2	0.3	0.3	1.07
ei	1054	20.4	15.6	15.1	0.8	91	90.2	1.2	1.1	0.5	1.29
tea	1082	11.7	7.7	9.4	1.5	52.1	50.6	1.6	2.8	0.2	–
pv	1041	0.2	0.8	0.4	-2.8	1.8	4.6	-0.6	-0.3	0	–
va	1041	0.5	0.9	0.7	-1.8	1.8	3.6	-0.8	-0.4	0	–
ge	1041	0.7	0.9	0.6	-1.7	2.3	4	-0.1	-1	0	–
rq	1041	0.6	0.9	0.7	-2	2.2	4.3	-0.4	-0.5	0	–
cc	1041	0.5	1	0.4	-1.7	2.5	4.1	0.2	-1.2	0	–
rl	1041	0.5	0.9	0.6	-2.2	2.1	4.3	-0.1	-1.2	0	–
gi	1041	0.5	0.8	0.6	-1.7	1.9	3.7	-0.2	-1.1	0	1.96
une	1069	7.9	5.2	6.9	0.1	33.9	33.8	1.7	3.8	0.2	1.05
trade	1045	87.1	59.6	69.6	4.1	425.4	421.2	2.6	9.5	1.8	1.21
pc	979	81.2	48.5	73.3	0.2	304.6	304.4	0.7	0	1.6	1.33
hdi	1013	0.8	0.1	0.8	0.4	1	0.6	-1.1	1	0	1.86

Note: We conducted the VIF test using a random effects model, considering all lag one values of the main independent variables on the current tea_{it}, as shown in equation (1).
Source: own study.

Possible moderating effects of entrepreneurial intention may take some time to materialize. Kinnunen *et al*. (2021) used fuzzy time series and the vector error correction model to analyse the influential factors at the micro and meso levels on entrepreneurial activity from 2011 to 2019. Their findings indicate that both contextual and motivational factors exhibit lagged effects on TEA with a lag of one to three years. This suggests that the impact of these factors is not immediate but rather delayed. This lag contributes to a more comprehensive understanding of how the relationship between motivational factors such as entrepreneurial intention and entrepreneurial activity manifests over various time periods. We augmented equation (1) by introducing three lagged values of entrepreneurial intention to explore the duration of moderating effects (equation 2). In equation (1), we assumed a one-year lag for the effects of entrepreneurial intention to manifest.

$$tea_{it} = \beta_1 gi_{it} + \beta_2 ei_{i,t-0,1,2,3} + \beta_3\left(gi_{it} * ei_{i,t-0,1,2,3}\right) + \Theta' X_{it-1} + \eta_i + \mu_t + \epsilon_{it} \quad (2)$$

In equation (3) below, we assessed how moderating effects vary across different levels of institution indices, both above and below average. Through interaction terms at median institutional levels, we analysed how entrepreneurial intention influences entrepreneurial activity differently based on institution levels, providing a nuanced understanding of the institutions-entrepreneurship linkage. This methodology enhances insights into the influence of institutions on the entrepreneurial process and its interaction with entrepreneurial intention. This approach contributes to a more comprehensive understanding of the dynamics between institutions and entrepreneurship, providing robust evidence for informed policy-making.

$$tea_{it} = \beta_1 gig_{it} + \beta_2 ei_{i,t-1} + \beta_3\left(gig_{it} * ei_{i,t-1}\right) + \Theta' X_{it-1} + \eta_i + \mu_t + \epsilon_{it} \quad (3)$$

in which gig_{it} indicates one of the six-institution indicators and its average for countries with above-average institutions.

Table 2. Methods comparison

Variables	(1)	(2)	(3)	(4)
	Pooled OLS	Random effects	Fixed effects	Fixed effects 2SLS
Dependent variable is total early-stage entrepreneurial activity (TEA)				
Institutions (GI)	-2.04***	-3.46***	-1.92	-11.53***
	(0.43)	(0.20)	(1.25)	(3.72)
Entre. Intention (L1)	0.22***	0.13***	0.07*	0.07***
	(0.02)	(0.005)	(0.02)	(0.02)
Trade (L1)	0.003	-0.002	-0.01*	-0.04***
	(0.003)	(0.002)	(0.01)	(0.01)
Credit (L1)	0.01**	0.0003	-0.005	-0.002
	(0.004)	(0.002)	(0.01)	(0.01)
HDI (L1)	-4.07	4.10***	8.96**	18.62***
	(2.83)	(0.98)	(4.22)	(6.62)
UNE (L1)	-0.10***	-0.004	-0.01	0.01
	(0.03)	(0.01)	(0.04)	(0.06)
Perceived Opp. (L1)	0.11***	0.11***	0.05***	0.06***
	(0.01)	(0.003)	(0.01)	(0.02)
Fear of Failure (L1)	-0.10***	-0.02***	-0.01	-0.01
	(0.02)	(0.01)	(0.02)	(0.02)
GI * EI (L1)	0.03*	0.01*	0.05**	0.50***
	(0.02)	(0.01)	(0.02)	(0.18)
Obs.	887	887	887	829
Hausman Chi^2			50.37***	
Instruments: Gov. Expenditure, Gov. Size	No	No	No	Yes
F-test (1^{st} stage)				3.82**
Wu-Hausman				10.0***
Sargan				1.2

Note: Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1.
Source: own study.

Results and discussions

Table 3 presents the regression results examining the moderating effect of pre-existing entrepreneurial intention on the relationship between institutions and TEA. The findings confirm a negative relationship between institutions and total entrepreneurial activity, after controlling for other factors. This negative impact is observed for most of individual institution dimensions such as control of corruption, government effectiveness, political stability, regulatory quality and rule of law. Our findings support the public choice theory and align with several existing studies (Miao *et al*., 2022; Audrestch *et al*., 2019; Chambers & Munemo, 2019; Friedman, 2011; Djankov *et al*., 2002). This negative impact of institutions on entrepreneurial activity can be attributed to several factors. Firstly, burdensome regulations and institutional barriers increase entry costs and opportunity costs, dissuading individuals from starting new businesses (Miao *et al*., 2022; Friedman, 2011). Secondly, countries with low institutional quality may offer limited access to paid job opportunities, thereby encouraging entrepreneurial ventures (Nikolaev *et al*., 2018). Moreover, in less efficient governments, entrepreneurs may 'grease the wheels' through bribery to facilitate business formation (Dutta & Sobel, 2016).

This study contributes to the existing literature by examining how entrepreneurial intention interacts with formal institutions to drive entrepreneurial outcomes. The results show a significant 4% to 50% increase in TEA, depending on the institution dimension, when entrepreneurial intention moderates the negative relationship between institutions and TEA. The coefficient for the average institution's index

(GI), moderated by entrepreneurial intention was 50%, emphasizing the substantial role of entrepreneurial intention in mitigating the negative influence of institutions on TEA. The moderating effects of entrepreneurial intention vary across institution dimensions, such as corruption control, regulatory quality, and rule of law indicators, resulting in a 4% increase in TEA. These results support the TPB, suggesting that in countries with higher levels of pre-existing entrepreneurial intention, the negative impact of institutions on TEA is less severe. Entrepreneurial intention fosters commitment and enables the formulation of strategies to overcome institutional challenges, including regulatory barriers and bureaucratic hurdles, in pursuit of entrepreneurial endeavours. Moreover, Table 3 confirms the important role of underlying factors that impact TEA, for instance, trade openness, HDI, and perceived opportunity.

The regression results in Table 4 offer insights into the relationship among pre-existing entrepreneurial intention, institutions, and TEA, incorporating three lagged variables of entrepreneurial intention. The Table reveals a persistent moderating effect of entrepreneurial intention on the link between institutions and TEA, indicating that the duration of moderating effects matters. Specifically, the results suggest a short-term moderating effect of up to two years, implying that entrepreneurial intention moderates the influence of institutions on TEA in the same year (lag 0) and the next year (lag 1) but not beyond that. These findings align with prior research by Kinnunen *et al.* (2021), who demonstrated that drivers of entrepreneurial activity, including entrepreneurial intention, exhibit a short-term moderating impact within a range of one to three years. This implies that the beneficial moderating effect of entrepreneurial intention on the institution-entrepreneurship relationship endures for up to two years and fades out over the longer term.

Table 4 results robustly confirm our moderation hypothesis aligning with the defined measure of entrepreneurial intention related to latent entrepreneurs planning to start a business within three years. Policymakers should acknowledge the short-term impact of entrepreneurial intention on the institution-entrepreneurship nexus when devising entrepreneurship promotion policies. It is important to recognize that the moderating effect of entrepreneurial intention diminishes over time with other factors potentially becoming more critical determinants of entrepreneurial activity.

Table 5 further explores the moderating effect of entrepreneurial intention, analysing variations across countries categorized as above-average and below-average in institutional quality. The results indicate that in countries with above-average institutions, especially in control of corruption and political stability, entrepreneurs with pre-existing intentions are more likely to engage in entrepreneurial activities compared to entrepreneurs in countries with below-average institutional components. This significant finding suggests a stronger moderating effect of entrepreneurial intention in countries with higher corruption control and political stability. This contributes significantly to the literature on the institution- entrepreneurship relationship, as previous studies did not confirm this positive influence of entrepreneurial intention. For policy considerations, in countries with above-average institution quality, especially in the above dimensions, efforts should focus on nurturing entrepreneurial intention through mentorship, networking, and resource accessibility. On the other hand, countries with below-average institution quality should prioritize improving the business environment while encouraging entrepreneurial intention. This may involve simplifying bureaucratic processes, reducing entry barriers, and enhancing access to finance and other resources for entrepreneurs.

Table 3. The moderating role of entrepreneurial intention in the linkage of institution and entrepreneurial activity across 112 countries (2001-2021)

Variables	Dependent variable is total early-stage entrepreneurial activity (TEA)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Institutions (GI)	-11.53***						
	(3.72)						
Control Corruption		-2.94***					
		(0.89)					
Gov. Effectiveness			-1.18				
			(0.88)				
Political Stability				-1.69**			
				(0.70)			
Regulatory Quality					-1.27		
					(0.89)		
Rule of Law						0.58	
						(1.04)	
Voice & Account.							-0.03
							(1.19)
Entre. Intention (EI) (L1)	0.07***	0.07***	0.08***	0.08***	0.07***	0.08***	0.08***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Trade (L1)	-0.04***	-0.02**	-0.01*	-0.02**	-0.01*	-0.01*	-0.01*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Credit (L1)	-0.002	-0.003	-0.003	-0.01	-0.002	-0.004	-0.003
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
HDI (L1)	18.62***	7.82*	7.67*	9.35**	7.55*	7.28*	8.30*
	(6.62)	(4.29)	(4.30)	(4.41)	(4.29)	(4.30)	(4.40)
UNE (L1)	0.01	-0.05	-0.03	-0.03	-0.03	-0.01	-0.02
	(0.06)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Perceived Opp. (L1)	0.06***	0.06***	0.06***	0.06***	0.06***	0.06***	0.06***
	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Fear of Failure (L1)	-0.01	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
GI * EI (L1)	0.50***						
	(0.18)						
CC * EI(L1)		0.04**					
		(0.02)					
GE * EI(L1)			0.02				
			(0.02)				
PV * EI(L1)				0.01			
				(0.02)			
RQ * EI(L1)					0.04**		
					(0.02)		
RL * EI(L1)						0.04*	
						(0.02)	
VA * EI(L1)							0.02
							(0.02)
Obs.	829	829	829	829	829	829	829
R^2	0.02	0.09	0.07	0.08	0.08	0.08	0.07
F Stat.	44.53***	66.42***	55.86***	61.24***	58.73***	59.89***	54.81***

Standard errors in parentheses; *p<0.1; **p<0.05; ***p<0.01.
Source: own study.

Table 4. Timeframes of the moderating effects of entrepreneurial intention

Variables	Dependent variable is total early-stage entrepreneurial activity (TEA)			
	(1)	(2)	(3)	(4)
Institutions (GI)	-18.74***	-11.53***	-2.39	37.32
	(6.50)	(3.72)	(20.73)	(77.77)
Entre. Intention (EI)	0.21***			
	(0.02)			
EI (L1)		0.07***		
		(0.02)		
EI (L2)			0.02	
			(0.28)	
EI (L3)				0.92
				(1.73)
Trade (L1)	-0.02**	-0.04***	-0.01	-0.08
	(0.01)	(0.01)	(0.01)	(0.12)
Credit (L1)	0.01	-0.002	-0.004	-0.03
	(0.01)	(0.01)	(0.02)	(0.07)
HDI (L1)	-7.89	18.62***	1.75	55.25
	(5.84)	(6.62)	(15.73)	(105.15)
UNE (L1)	-0.09	0.01	-0.06	-0.25
	(0.06)	(0.06)	(0.11)	(0.45)
Perceived Oppo. (L1)	0.01	0.06***	0.06	0.18
	(0.02)	(0.02)	(0.05)	(0.24)
Fear of Failure (L1)	-0.03	-0.01	-0.02	-0.07
	(0.02)	(0.02)	(0.04)	(0.14)
GI* EI(L0)	0.81***			
	(0.31)			
GI* EI(L1)		0.50***		
		(0.18)		
GI* EI(L2)			0.004	
			(1.07)	
GI* EI(L3)				-2.10
				(4.06)
Obs.	856	829	829	829
R^2	0.12	0.02	0.05	0.004
F Stat.	117.84***	44.53***	36.95***	1.83

Standard errors in parentheses; *p<0.1; **p<0.05; ***p<0.01.

Source: own study.

Table 5. The moderating effects of entrepreneurial intention in countries with above-average and below-average institutions

Variables	Dependent variable is total early-stage entrepreneurial activity (TEA)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
GI P2	-17.63						
	(17.28)						
CC P2		-8.25**					
		(4.17)					
GE P2			-7.22				
			(4.49)				
PV P2				-6.59**			
				(2.79)			
RQ P2					42.99		
					(66.96)		
RL P2						-12.92	
						(8.72)	
VA P2							-18.33
							(12.71)
Entre. Intention (EI) (L1)	-0.26	-0.09	-0.07	-0.04	0.62	-0.10	-0.24
	(0.30)	(0.09)	(0.08)	(0.06)	(0.87)	(0.11)	(0.21)
Trade (L1)	-0.06	-0.03**	-0.01	-0.03**	0.05	-0.02*	-0.04*
	(0.04)	(0.01)	(0.01)	(0.01)	(0.10)	(0.01)	(0.02)
Credit (L1)	-0.01	-0.005	0.001	-0.004	0.04	-0.005	-0.02
	(0.02)	(0.01)	(0.01)	(0.01)	(0.07)	(0.01)	(0.01)
HDI (L1)	16.55	13.44**	6.69	15.02**	13.04	-2.41	18.90*
	(11.37)	(5.97)	(4.88)	(5.96)	(17.24)	(7.42)	(10.40)
UNE (L1)	0.04	-0.01	-0.04	-0.04	-0.04	0.02	0.09
	(0.08)	(0.05)	(0.05)	(0.05)	(0.15)	(0.06)	(0.10)
Perceived Oppo. (L1)	0.05**	0.06***	0.06***	0.06***	0.08	0.04**	0.04*
	(0.02)	(0.01)	(0.01)	(0.01)	(0.05)	(0.02)	(0.02)
Fear of Failure (L1)	-0.04	-0.03	-0.02	-0.01	0.01	-0.04	-0.05
	(0.04)	(0.02)	(0.02)	(0.02)	(0.07)	(0.03)	(0.04)
GI P2 * EI(L1).	1.21						
	(1.07)						
CC P2 * EI(L1).		0.55*					
		(0.30)					
GE P2 * EI(L1).			0.56*				
			(0.29)				
PV P2 * EI(L1).				0.38**			
				(0.18)			
RQ P2 * EI(L1).					-2.35		
					(3.76)		
RL P2 * EI(L1).						0.77*	
						(0.46)	
VA P2 * EI(L1)							1.24
							(0.83)
Obs	829	829	829	829	829	829	829
R^2	0.03	0.03	0.03	0.01	0.02	0.04	0.02
F Stat.	22.80***	45.46***	47.89***	48.40***	5.69	40.19***	23.17***

Note: P1 is the below-average indicator (the reference group) while P2 is the above-average indicator.
Standard errors in parentheses; *p<0.1; **p<0.05; ***p<0.01.
Source: own study.

CONCLUSIONS

We examined the role of entrepreneurial intention in the context of formal institutions and entrepreneurship, using GEM data from 2001 to 2021 across 112 economies. We explored how pre-existing entrepreneurial intention mitigates adverse institutional effects of entrepreneurial activity, providing new insights into the moderating role of entrepreneurial intention in the institution-entrepreneurship nexus.

This study offers several notable features. Firstly, it captures comprehensive institutional factors across six dimensions, *i.e.* government effectiveness, rule of law, political stability, voice and accountability, regulatory quality, and control of corruption, extending previous research that often focuses on selected dimensions. Secondly, it considers the timeframes for the moderating impact of entrepreneurial intention. Lastly, the study integrates the theory of planned behaviour, a renowned management theory, to explore potential drivers of entrepreneurial outcomes in relation to institutional factors.

This study's distinctive findings challenge expectations and reveal a counterintuitive result that good institutions do not always foster entrepreneurship across various dimensions. The negative impact is linked to stringent regulatory framework and bureaucratic hurdles in countries with high institutional quality (Miao *et al*., 2022), in support of the public choice theory. Interestingly, the influence of institutions on entrepreneurship varies based on pre-existing entrepreneurial intention levels at the country level. The study emphasizes the role of entrepreneurial intention in mitigating the negative impact of institutions, ranging from 4% to 50% on average, depending on the institution's dimension. In countries with above-average institution quality, especially in control of corruption and political stability, latent entrepreneurs are approximately more likely to translate intentions into actual outcomes compared to those in lower-quality institutional environments. Notably, the moderating effect of entrepreneurial intention is short-term, lasting up to two years and diminishing over the longer term.

The study's key findings highlight the importance of individual-level factors in the institution-entrepreneurship relationship, emphasizing the need to consider such factors in policy interventions. To promote entrepreneurship, policies should focus on nurturing and shaping entrepreneurial intentions. For example, training programs can motivate individuals to pitch business ideas and engage in entrepreneurial ventures. Prior research suggests that university education significantly influences young people's entrepreneurial intention by developing attitudes, perceived behavioural control, and entrepreneurial self-efficacy (Doanh, 2021; Wach & Wojciechowski, 2016). These implications are particularly relevant for countries with high institutional quality, where strong entrepreneurial intention can drive commitment and efforts to overcome institutional challenges, as confirmed by our study.

While this study sheds new light on the relationship between institutions and entrepreneurship through the moderating effects of entrepreneurial intention, certain limitations provide avenues for future research when data becomes available. Firstly, the sample size was limited to 112 countries, representing approximately 58% of countries worldwide. It would be valuable to examine the moderating effect of entrepreneurial intention on a broader scale. Secondly, the literature suggests that institutional factors impact entrepreneurial activity differently based on entrepreneurship types, such as opportunity vs. necessity, formal vs. informal, and small-scale vs. large-scale. Due to data limitations, we did not explore classifications of entrepreneurial activity in connection to institutions and the role of entrepreneurial intention. The third limitation is that our model did not incorporate informal institutions such as cultural and social norm variables due to a lack of consistent and reliable data sources. Including these variables could provide further insights into their influence on the relationship between institutions and entrepreneurial activity.

REFERENCES

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179-211. https://doi.org/10.1016/0749-5978(91)90020-T

Andriopoulos, C. (2003). Six paradoxes in managing creativity: An embracing act. *Long Range Planning*, *36*, 375-388. https://doi.org/10.1016/S0024-6301(03)00071-2

Anokhin, S., & Schulze, W.S. (2009). Entrepreneurship, innovation, and corruption. *Journal of Business Venturing*, *24*(5), 465-476. https://doi.org/10.1016/j.jbusvent.2008.06.001

Audretsch, D.B., Belitski, M., & Desai, S. (2019). National business regulations and city entrepreneurship in Europe: A multilevel nested analysis. *Entrepreneurship Theory and Practice*, *43*(6), 1148-1165. https://doi.org/10.1177/1042258718774916

Audretsch, D.B., & Fiedler, A. (2021). The Vietnamese entrepreneurship paradox: How can entrepreneurs thrive without political and economic freedom?. *The Journal of Technology Transfer*, 1-19. https://doi.org/10.1007/s10961-021-09873-2

Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology*, *52*(1), 1-26. https://doi.org/10.1111/1467-839X.00024

Baumol, W.J. (1996). Entrepreneurship: Productive, unproductive, and destructive. *Journal of Business Venturing*, *11*(1), 3-22. https://doi.org/10.1016/0883-9026(94)00014-X

Belitski, M., Chowdhury, F., & Desai, S. (2016). Taxes, corruption, and entry. *Small Business Economics*, *47*, 201-216. https://doi.org/10.1007/s11187-016-9724-y

Bosma, N., Content, J., Sanders, M., & Stam, E. (2018). Institutions, entrepreneurship, and economic growth in Europe. *Small Business Economics*, *51*, 483-499. https://doi.org/10.1007/s11187-018-0012-x

Bowen, H.P., & Clercq, D. (2008). Institutional context and the allocation of entrepreneurial effort. *Journal of International Business Studies*, *39*(4), 747-767. https://doi.org/10.1057/palgrave.jibs.8400343

Busse, M., & Hefeker, C. (2007). Political risk, institutions and foreign direct investment. *European Journal of Political Economy*, *23*(2), 397-415. https://doi.org/10.1016/j.ejpoleco.2006.02.003

Chambers, D., & Munemo, J. (2019). Regulations, institutional quality and entrepreneurship. *Journal of Regulatory Economics*, *55*, 46-66. https://doi.org/10.1007/s11149-019-09377-w

Chowdhury, F., Audretsch, D.B., & Belitski, M. (2019). Institutions and entrepreneurship quality. *Entrepreneurship Theory and Practice*, *43*(1), 51-81. https://doi.org/10.1177/1042258718780431

Davila, T., Epstein, M.J., & Shelton, R.D. (2006). *The creative enterprise: Managing innovative organizations and people*. Greenwood Publishing Group. Connecticut, USA.

De Pillis, E., & Reardon, K.K. (2007). The influence of personality traits and persuasive messages on entrepreneurial intention: A cross-cultural comparison. *Career Development International*, *12*(4), 382-396. https://doi.org/10.1108/13620430710756762

Dean, T.J., & Brown, R.L. (1995). Pollution regulation as a barrier to new firm entry: Initial evidence and implications for future research. *Academy of Management Journal*, *38*(1), 288-303. https://doi.org/10.5465/256737

Djankov, S., La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (2002). The regulation of entry. *The Quarterly Journal of Economics*, *117*(1), 1-37. https://doi.org/10.1162/003355302753399436

Doanh, D.C. (2021). The role of contextual factors on predicting entrepreneurial intention among Vietnamese students. *Entrepreneurial Business and Economics Review, 9*(1), 169-188. https://doi.org/10.15678/EBER.2021.090111

Dutta, N., & Meierrieks, D. (2021). Financial development and entrepreneurship. *International Review of Economics & Finance*, *73*, 114-126. https://doi.org/10.1016/j.iref.2021.01.002

Dutta, N., & Sobel, R. (2016). Does corruption ever help entrepreneurship?. *Small Business Economics*, *47*, 179-199. https://doi.org/10.1007/s11187-016-9728-7

Dutta, N., & Sobel, R.S. (2018). Entrepreneurship and human capital: The role of financial development. *International Review of Economics & Finance*, *57*, 319-332. https://doi.org/10.1016/j.iref.2018.01.020

Farashah, AD. (2015). The effects of demographic, cognitive and institutional factors on development of entrepreneurial intention: Toward a socio-cognitive model of entrepreneurial career. *Journal of International Entrepreneurship, 13*, 452-476.

Feng, Y. (2001). Political freedom, political instability, and policy uncertainty: A study of political institutions and private investment in developing countries. *International Studies Quarterly*, *45*(2), 271-294. https://doi.org/10.1111/0020-8833.00191

Fogel, K., Hawk, A., Morck, R., & Yeung, B. (2006). *Oxford Handbook of Entrepreneurship*. Oxford University Press. Oxford, UK.

Fredström, A., Peltonen, J., & Wincent, J. (2021). A country-level institutional perspective on entrepreneurship productivity: The effects of informal economy and regulation. *Journal of Business Venturing*, *36*(5), 106002. https://doi.org/10.1016/j.jbusvent.2020.106002

Friedman, B.A. (2011). The relationship between governance effectiveness and entrepreneurship. *International Journal of Humanities and Social Science*, *1*(17), 221-225. Retrieved from https://www.academia.edu/66330156/ on December 6, 2023.

Fu, K., Wennberg, K., & Falkenhall, B. (2020). Productive entrepreneurship and the effectiveness of insolvency legislation: A cross-country study. *Small Business Economics*, *54*, 383-404. https://doi.org/10.1007/s11187-018-0040-6

Fuentelsaz, L., González C., Maícas, JP., & Montero, J. (2015) How different formal institutions affect opportunity and necessity entrepreneurship. *BRQ Business Research Quarterly 18*(4), 246-258, https://doi.org/10.1016/j.brq.2015.02.001

Herrera-Echeverri, H., Haar, J., & Estévez-Bretón, J.B. (2014). Foreign direct investment, institutional quality, economic freedom and entrepreneurship in emerging markets. *Journal of Business Research*, *67*(9), 1921-1932. https://doi.org/10.1016/j.jbusres.2013.11.020

Hanoteau, J., & Vial, V. (2020). Institutional quality, conforming and evasive entrepreneurship. *Eurasian Business Review*, *10*(1), 97-121. https://doi.org/10.1007/s40821-020-00151-z

Kautonen, T., Gelderen, V.M., & Fink, M. (2013). Robustness of the Theory of Planned Behavior in Predicting Entrepreneurial Intentions and Actions. *Entrepreneurship Theory and Practice*, *39*(3), 655-674. https://doi.org/10.1111/etap.12056

Kerr, W.R., & Nanda, R. (2011). Financing constraints and entrepreneurship. *NBER* working paper. https:/doi.org/10.3386/w15498h

Khalilov, L., & Yi, C.D. (2021). Institutions and entrepreneurship: Empirical evidence for OECD countries. *Entrepreneurial Business and Economics Review*, *9*(2), 119-134. https://doi.org/10.15678/EBER.2021.090208

Khyareh, M.M. (2017). Institutions and entrepreneurship: The mediating role of corruption. *World Journal of Entrepreneurship, Management and Sustainable Development*, *13*(3), 262-282. https://doi.org/10.1108/WJEMSD-09-2016-0045

Khyareh, M.M. (2023). Entrepreneurship and Economic Growth: The Moderating Role of Governance Quality. *FIIB Business Review*, 23197145231154770. https://doi.org/10.1177/23197145231154767

Kinnunen, J., Georgescu, I., & Hosseini, Z. (2022). Drivers of entrepreneurial activity at micro and meso levels: a fuzzy time-series analysis. In *Intelligent and Fuzzy Techniques for Emerging Conditions and Digital Transformation: Proceedings of the INFUS 2021 Conference, held August 24-26, 2021. Volume 2* (pp. 423-430). Springer International Publishing.

Kolvereid, L., & Isaksen, E. (2006). New business start-up and subsequent entry into self-employment. *Journal of Business Venturing*, *21*(6), 866-885. https://doi.org/10.1016/j.jbusvent.2005.06.008

Krueger Jr, N.F., Reilly, M.D., & Carsrud, A.L. (2000). Competing models of entrepreneurial intentions. *Journal of Business Venturing*, *15*(5-6), 411-432. https://doi.org/10.1016/S0883-9026(98)00033-0

Krueger, N. (1993). The impact of prior entrepreneurial exposure on perceptions of new venture feasibility and desirability. *Entrepreneurship Theory and Practice*, *18*(1), 5-21. https://doi.org/10.1177/104225879301800101

Leszczensky, L., & Wolbring, T. (2022). How to deal with reverse causality using panel data? Recommendations for researchers based on a simulation study. *Sociological Methods & Research*, *51*(2), 837-865. https://doi.org/10.1177/0049124119882473

Lv, Z., Rodríguez-García, M., & Sendra-García, J. (2021) Does institutional quality affect the level of entrepreneurial success differently across the entrepreneurship distribution?. *Review of Managerial Science, 15*, 937-955. https://doi.org/10.1007/s11846-020-00383-3

Marvel, M.R., Davis, J.L., & Sproul, C.R. (2016). Human capital and entrepreneurship research: A critical review and future directions. *Entrepreneurship Theory and Practice*, *40*(3), 599-626. https://doi.org/10.1111/etap.12136

Miao, C., Gast, J., Laouiti, R., & Nakara, W. (2022). Institutional factors, religiosity, and entrepreneurial activity: A quantitative examination across 85 countries. *World Development*, *149*, 105695. https://doi.org/10.1016/j.worlddev.2021.105695

Munemo, J. (2012). Entrepreneurship in developing countries: Is Africa different?. *Journal of Developmental Entrepreneurship*, *17*(01), 1250004. https://doi.org/10.1142/S1084946712500045

Nikolaev, B.N., Boudreaux, C.J., & Palich, L. (2018). Cross-country determinants of early-stage necessity and opportunity-motivated entrepreneurship: Accounting for model uncertainty. *Journal of Small Business Management*, *56*, 243-280. https://doi.org/10.1111/jsbm.12400

North, D.C. (1990). A transaction cost theory of politics. *Journal of Theoretical Politics*, *2*(4), 355-367. https://doi.org/10.1177/0951692890002004001

Nyström, K. (2008). The institutions of economic freedom and entrepreneurship: Evidence from panel data. *Public Choice*, *136*, 269-282. https://doi.org/10.1007/s11127-008-9295-9

Primo, D.M. (2008). Rules and restraint: Government spending and the design of institutions. University of Chicago Press.

Radipere, N.S., & Ladzani, W. (2014). The effects of entrepreneurial intention on business performance. J*ournal of Governance and Regulation*, *3*(4), 190-202. Retrieved from https://uir.unisa.ac.za/handle/10500/20091 on December 6, 2023.

Salimath, M.S., & Cullen, J.B. (2010). Formal and informal institutional effects on entrepreneurship: A synthesis of nation-level research. *International Journal of Organizational Analysis*. https://doi.org/10.1108/19348831011062175

Sobel, R.S. (2008). Testing Baumol: Institutional quality and the productivity of entrepreneurship. *Journal of Business Venturing*, *23*(6), 641-655. https://doi.org/10.1016/j.jbusvent.2008.01.004

Stigler, G.J. (2021). The theory of economic regulation. In *The political economy: Readings in the politics and economics of American public policy* (pp. 67-81). Routledge.

Tsai, K.H., Chang, H.C., & Peng, C.Y. (2016). Refining the linkage between perceived capability and entrepreneurial intention: Roles of perceived opportunity, fear of failure, and gender. *International Entrepreneurship and Management Journal*, *12*(4), 1127-1145. https://doi.org/10.1007/s11365-016-0383-x

Urbano, D., Aparicio, S., & Audretsch, D. (2019). Twenty-five years of research on institutions, entrepreneurship, and economic growth: What has been learned?. *Small Business Economics*, *53*, 21-49. https://doi.org/10.1007/s11187-018-0038-0

Wach, K., & Wojciechowski, L. (2016). Entrepreneurial Intentions of Students in Poland in the View of Ajzen's Theory of Planned Behaviour. *Entrepreneurial Business and Economics Review, 4*(1), 83-94. https://doi.org/10.15678/EBER.2016.040106

Wood, M.S., Bylund, P., & Bradley, S. (2016). The influence of tax and regulatory policies on entrepreneurs' opportunity evaluation decisions. *Management Decision*, *54*(5), 1160-1182. https://doi.org/10.1108/MD-10-2015-0446

Xu, L.C. (2011). The effects of business environments on development: Surveying new firm-level evidence. *The World Bank Research Observer*, *26*(2), 310-340. https://doi.org/10.1093/wbro/lkq012

Appendix:

Table A1. Variable definition

Abbreviation	Variable	Definition	Source
TEA	Total early-stage entrepreneurial activity (TEA) rate	Percentage of population aged 18-64 who are either nascent entrepreneurs or owner-manager of a new business	GEM
EI	Entrepreneurial intention	Percentage of the population aged 18-64 who are latent entrepreneurs with the intention to start a business within three year	GEM
PO	Perceived opportunity	Percentage of the population aged 18-64 (excluding those engaged in any stage of entrepreneurial activity) who see good opportunities to start a firm in the area where they live	GEM
FFR	Fear of failure	Percentage of the population aged 18-64 (excluding those engaged in any stage of entrepreneurial activity) who indicate that fear of failure would prevent them from setting up a business	GEM
GI	Institutions	The average of the six institutions indices	Own calculation from WGI
CC	Control of corruption	Perceptions of public power misuse for private gain, including both petty and grand corruption, and state 'capture' by elites and private interests	WGI
GE	Government effectiveness	Perceptions of the quality of public services	WGI
PV	Political stability and absence of violence	Perceptions of the likelihood of political instability and/or politically motivated violence, including terrorism	WGI
RQ	Regulatory quality	Perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development	WGI
RL	Rule of law	Perceptions of the extent to which agents have confidence in and abide by the rules of society	WGI
VA	Voice and accountability	Perceptions on government participation, freedom of expression, association, and media freedom	WGI
HDI	Human development	Human Development Index	UNDP
UNE	Unemployment	Unemployment, total (% of total labour force) (modelled ILO estimate)	WDI
Trade	Trade openness	Sum of exports and imports divided by GDP	WDI
Credit	Private credit	Domestic credit to private sector (% of GDP)	WDI

Note: for more information about institutional indicators,
see https://www.worldbank.org/en/publication/worldwide-governance-indicators
Source: own study.

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Acknowledgements and Financial Disclosure

The authors received no financial support for the research, authorship, and/or publication of this article.

Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Published by Krakow University of Economics – Krakow, Poland

Ministry of Education and Science
Republic of Poland

The journal is co-financed in the years 2022-2024 by the Ministry of Education and Science of the Republic of Poland in the framework of the ministerial programme "Development of Scientific Journals" (RCN) on the basis of contract no. RCN/SP/0583/2021/1 concluded on 13 October 2022 and being in force until 13 October 2024.

Entrepreneurial Business and Economics Review

2024, Vol. 12, No. 2

10.15678/EBER.2024.120206

Technology adoption of small and medium-sized enterprises and performance in European countries: A cross-country panel cointegration analysis

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ABSTRACT

Objective: The objective of the article is to explore the impact of the new technology adoption on the performance of small and medium-sized enterprises (SMEs) at the country level.

Research Design & Methods: The authors modelled the effect of technology adoption (TA) on SMEs' market and sustainability performance by using the dynamic ordinary least squares regression technique. The analysis used a sample of 12 EU countries from 2008 to 2021. Regional specificities of the Baltic and Central European countries were introduced. We obtained a novel database from the European Union's SME Performance Review indicators.

Findings: The results show that TA positively affects both market and sustainability performance in European SMEs at the country level. This impact is larger for market performance than for sustainability performance. Moreover, the long-run equilibrium relationships between TA and market performance demonstrate a positive effect in Central European countries and a negative effect in Baltic countries. Moreover, the impact of TA on sustainability performance proves negative for the joint group of new member countries consisting of Baltic and Central European states unlike for old member countries.

Implications & Recommendations: The findings suggest the adoption of a more strategic perspective among SMEs regarding TA. Furthermore, the study offers policy recommendations aimed at facilitating the green transformation of new member countries.

Contribution & Value Added: The effects of TA on market and sustainability performance have not yet been examined by applying an econometrically sophisticated analytical sequence on a panel dataset of countries' SMEs. For policymakers, the findings demonstrate that environmentally friendly technologies, through enhancing sustainability performance, can be a solid pillar that undergirds a widespread green economic transition.

Article type:	research article
Keywords:	technology adoption; market performance; sustainability performance; SMEs; cointegration
JEL codes:	O33, M21, C10

Received: 25 October 2023 Revised: 22 December 2023 Accepted: 25 January 2024

Suggested citation:
Endrődi-Kovács, V., Pérez Garrido, B., & Sebrek, S.S. (2024). Technology adoption of small and medium-sized enterprises and performance in European countries: A cross-country panel cointegration analysis. *Entrepreneurial Business and Economics Review,* 12(2), 97-112. https://doi.org/10.15678/EBER.2024.120206

INTRODUCTION

Small and medium-sized enterprises (SMEs) play a significant role in the economies of European Union (EU) countries, employing nearly two-thirds of the workforce and contributing slightly over half of the economic value added (Eurostat, 2022a). Previous research indicates that innovation and technology adoption (TA) positively impact company performance. Notwithstanding this, a major unaddressed controversy in the SME literature is that the latter studies were conducted either at the firm level in the form of case studies (Mustafa & Yaakub, 2018; Jalil *et al.*, 2022) or on a specific industry or set of industries (Pinto, 2020; Rosli & Sidek, 2013). Scholarly studies have not

specifically examined the effectiveness of TA in relation to national-level SME performance (Zamani, 2022), and they have failed to provide actionable insights for policymakers, primarily due to the absence of comprehensive inter-country-level databases (Xu *et al.*, 2021).

Technology adoption may increase SMEs' market performance and reduce the latter's environmental impact – which the European Green Deal calls for – with SMEs playing a crucial role (Muller *et al.*, 2022). Firm-level studies have highlighted the beneficial role of TA in sustainability performance in the areas of environmental efficiency (Yacob *et al.*, 2019), data-driven analytics (Chen *et al.*, 2020), technology-based sustainable practices (Gangwar *et al.*, 2023), and supply chain transparency (Maqsood *et al.*, 2022). However, studies that examine this relationship at the country level, with SMEs as the central focus of empirical investigations, are lacking.

The article investigates the long-term relationship between technology adoption and the market and sustainability performance of the SMEs of EU-member OECD states. Moreover, it seeks to analyse how this relationship is influenced by the innovation potential of the region where the country's SMEs are located.

For this purpose, we assembled a novel database that adopted the SME Performance Review (SPR) indicators compiled by the EU. The article applies Eurostat's definition of an SME: An enterprise with fewer than 250 employees, with annual turnover not exceeding EUR 50 million, and/or whose annual balance sheet total does not exceed EUR 43 million (European Commission, 2003). We conducted the analysis on a sample of 12 EU member states and OECD countries from 2008 to 2021. For a more detailed analysis aligned with our research objectives, we developed distinct measures for Baltic and Central European countries, in addition to those for a group comprising older, innovation-leading EU members.

Using a distinctive longitudinal country-level database for SMEs, this article affirms the presence of the positive impact of TA on the market performance of SMEs at the state level. Moreover, the long-run equilibrium relationships revealed that these effects vary between the two groups of newer member countries, eliciting a positive effect for Central European countries and a negative effect for Baltic countries. Our study affirms the positive impact of TA on the sustainability performance of European SMEs at the country level. Interestingly, this effect proves negative for the combined group of new member countries consisting of Baltic and Central European states, unlike the old ones. Furthermore, TA has a stronger impact on market performance than sustainability performance, underscoring the significance of governmental and corporate policies that foster technology-driven environmental sustainability efforts. As part of the managerial recommendations aimed at maximising the positive effects of TA on sustainability performance for the newer EU Member States with lower innovation levels, this study underscores the significance of bolstering their SMEs' external partnerships, licensing strategies, dynamic capabilities, and establishing of an advanced network of R&D centres, drawing inspiration from Western European models.

Another significant contribution of this article is methodological. To ensure valid inferences using the estimated coefficients, we implemented a comprehensive sequence of econometric analyses, making our research unique in business economics. This included investigating cross-sectional dependence across countries (see Pesaran, 2015; Croissant & Millo, 2019), assessing the presence of unit roots (Croissant & Millo, 2019), examining the existence of long-run relationships in the panel series using a panel cointegration test (Pedroni, 1999), and estimating long-run relationships using dynamic ordinary least square estimators (Saikkonen, 1991).

Following the introduction, Section 2 will discuss previous contributions to understanding the relationship of TA with both market and sustainability performance and develop hypotheses based on the literature. Section 3 will give an overview of the data and methodology applied. Section 4 will present the sequence of econometric analyses and their results. Section 5 will define the contributions, note limitations, and suggest further research avenues.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

TA by SMEs and its Effect on Market Performance

Technology adoption significantly improves SMEs' market performance by leveraging business process activities (Guo *et al.*, 2017).

Firstly, TA is positively associated with firms' efficiency and productivity (Cieślik *et al.*, 2016). Information-processing theory suggests that TA increases the efficiency of information processing inside an organisation. Technology improves business information gathering, analysis, and transmission, improving decision-making and performance (Srinivasan & Swink, 2018). Secondly, TA reduces firms' costs by optimising processes, eliminating errors, and minimising the physical resources required (Kumar & Ayedee, 2021). Technology diffusion resulting from TA also enhances productivity, lowers prices, and improves production processes (Fuentelsaz *et al.*, 2009; Greve & Seidel, 2014).

Thirdly, TA can increase firms' competitive advantage (Sebrek, 2015; 2020; Wadood *et al.*, 2022). Following the resource-based view, TA provides valuable resources associated with distinctive capabilities that improve firm performance and competitive advantage over rivals (Niehm *et al.*, 2010). Fourthly, TA may enhance the customer experience by helping implement customer relationship management systems, personalising communication, and providing timely support (Salah *et al.*, 2021).

Fifthly, TA strengthens SMEs' agility and adaptability; it enables businesses to quickly adapt to changing market conditions and customer demands (Teece, 2007). For instance, with the right information and communication technology (ICT) tools, companies can modify processes, launch new products or services, and respond to market trends. Finally, adopting new technologies frequently leads to innovation and creates new opportunities. Notably, technologies like blockchain and virtual reality can disrupt industries and create novel business models (Mustafa & Yaakub, 2018; Semenova *et al.*, 2023).

Scholars have extensively studied technology adoption in SMEs' business processes. Torrent-Sellens *et al.* (2022) concluded from a study of a large sample of Spanish SMEs during the period 1991-2016 that there is a total factor productivity gap between companies which implement ICT investments, R&D activities, and product innovation, and those who do not or fail at this. Other studies have employed a cross-sectional analysis. Jalil *et al.* (2022) found a positive relationship between innovation capabilities and SME performance among 611 Malaysian SMEs (involving cost-effectiveness, product performance, stakeholder satisfaction, and improved enterprise image). These results are in line with the findings of Mustafa and Yaakub (2018) and Octavia *et al.* (2020) for Indonesia, and the results of Chege *et al.* (2020) for Kenya. Thus, few studies have examined the impact of TA on firm performance using longitudinal cross-country samples.

The findings and mechanisms identified in earlier research at lower units of analysis indicate a positive association between TA and SME market performance. Therefore, we formulated the following hypothesis:

H1: In the context of SMEs at the country level, a positive relationship exists between TA and market performance.

TA by SMEs Impacting Sustainability Performance

Scholars have been increasingly interested in SMEs' sustainability performance. In line with the claims of stakeholders (Marcon Nora *et al.*, 2023; Flammer & Kacperczyk, 2016) and institutional theories (Berrone *et al.*, 2013), there is increasing external pressure on firms for TA aligned with sustainability goals to meet the expectations of stakeholders concerned with environmental and social issues.

Moreover, TA can exert a profound influence on the sustainability performance of both individual firms and entire countries. Until recently, SMEs considered sustainability an expense. However, evidence now indicates that sustainability can be valuable for organizations and can strengthen the firm's value and contribute to stable financial and company performance (Ye *et al.*, 2022; Fatemi *et al.*, 2018; Pinto, 2020). Several mechanisms can be identified that show how TA can affect firms' sustainability

performance. Firstly, in accordance with the eco-efficiency theory (Czerny & Letmathe, 2017), by implementing green technologies, SMEs can increase their environmental efficiency; they can minimise the by-products of wastes, decrease energy consumption and reduce greenhouse gas emissions.

Secondly, by leveraging data analytics, businesses can gain insights into resource usage, identify inefficiencies, and develop targeted sustainability strategies (Chen *et al.*, 2020). Thirdly, TA can drive innovation in sustainable practices, products, and services. Technologies like the Internet of Things, artificial intelligence, and data analytics can optimise resource usage, enable predictive maintenance, and foster sustainable innovation (Gangwar *et al.*, 2023; Pappas *et al.*, 2018). Finally, TA is considered a dynamic capability that enables firms to proactively respond to changing environmental conditions and capitalise on sustainability-related opportunities (Dangelico *et al.*, 2017).

Several studies have examined the effects of SMEs' technology adoption on sustainability at a single-country level. Based on an examination of 350 Pakistani manufacturing SMEs, Maqsood *et al*. (2022) concluded that clean innovation technology contributes to sustainable production and consumption and supports SME performance. After examining 260 Malaysian manufacturing SMEs, Yacob et al. (2019) found that energy management, water conservation, and waste management technologies are related to environmental sustainability. Hossain *et al.* (2020), who surveyed 220 Bangladeshi manufacturing SMEs, stated that environmental technological adoption positively relates to sustainable green practices. The literature review demonstrates that adopting new can influence SMEs' market performance and play a vital role in intensifying sustainability performance. However, no previous study has examined the relationship between TA and sustainability performance at the national level using a cross-country comparison of the SME population. Therefore, we hypothesised:

H2: In the context of SMEs at the country level, a positive relationship exists between TA and sustainability performance.

Regional Effects

Contingency theory underscores the significance of contextual circumstances in shaping the relationship between TA and performance. This theory places substantial emphasis on the necessity of aligning TA with the specific requirements and characteristics of the national industrial context to enhance performance (Ahmed *et al.*, 2020; Bhatia & Kumar, 2023).

In the contemporary business landscape, the relationship between TA and firm performance is a multifaceted phenomenon influenced by the regional context within which firms operate (Filippetti & Guy, 2020; Xu *et al.*, 2021). This study asserts that the effectiveness of TA in enhancing firm performance is contingent upon the innovation potential of the region where a country's SMEs are situated. Specifically, innovation-leading regions comprising a group of countries can potentially enhance the positive relationship between TA and firm performance. Conversely, this relationship may be weakened or attenuated in regions with lower innovation potential:

H3a: In the context of SMEs at the country level, the positive relationship between TA and market performance is expected to be stronger in innovation-leader regions and weaker in lower innovation regions.

H3b: In the context of SMEs at the country level, the positive relationship between TA and sustainability performance is expected to be stronger in innovation-leader regions and weaker in lower innovation regions.

RESEARCH METHODOLOGY

Data and Variables

This study considers data from 2008 to 2021 from 12 OECD countries, *i.e.* Austria, Belgium, the Czech Republic, Denmark, Estonia, Germany, Hungary, Latvia, Lithuania, Netherlands, Poland, and Sweden. We took data from the SME performance review (SPR) indicators set by the European Commission. The scoreboard of indices employs quantitative indicators that cover dimensions relevant to SME performance and presents them in accordance with the Small Business Act and its conceptual framework

(De Pedraza Garcia & Anastasis, 2022). All our variables can be found in the SPR database. We briefly explained its origins and data collection methods alongside dependent or independent variables.

The econometrical analysis involves two dependent variables: the market performance and sustainability performance of the SMEs within a specific country. The former (MARKET_PERF) is measured by 'sales of new-to-market and new-to-firm innovation (in % of turnover),' which information originally comes from Eurostat's community innovation surveys (CIS). National authorities conduct CIS among domestic SMEs. The aggregation is also conducted by national authorities in accordance with Eurostat's recommendations and under its tight control (Eurostat, 2022b). The latter (SUSTAIN_PERF) was created using factor analysis (FA) implemented in the *psych* package in *R*. Nine sustainability and environmental variables were used for that. The Eurobarometer surveys on SMEs and green markets (European Commission, 2022) provided the data for the m_1-m_5 variables [m_1: SMEs that have taken resource-efficiency measures (in %), m_2: SMEs that have benefited from public support measures for their resource-efficiency actions (in %), m_3: SMEs that offer green products or services (in %), m_4: SMEs with a turnover share of more than 50% generated by green products or services, m_5: SMEs that have benefited from public support measures for their production of green products (in %)]. The environmental protection expenditure dataset (Eurostat, 2022c) contained the m_6 (SME investment in equipment and plant for pollution control) and m_7 (SME investment in equipment and plant linked to cleaner technology) statistics. Data for all nine sustainability and environmental variables were acquired through direct communication with the sampled SMEs, including personal visits, telephone interviews, web-based interviews, and self-administered questionnaires, followed by validation of the results by Eurostat and their publishing at the country level. We processed all data using Eurostat's metadata quality assessment methodology (European Commission, 2023). We used OECD's green growth indicators (2022) to measure the m_8 (environmental technologies as a proportion of all technologies) and m_9 (CO_2 productivity) variables. These indicators are measured at the country level, not specifically for SMEs. However, these indicators are listed in SPR and may be seen as appropriate indicators for measuring SME performance.

We conducted dimension reduction in two steps. Firstly, we ran FA (details available upon request), which suggested reducing the original nine variables into three: m_1, m_3, and m_9. Secondly, we reran FA considering only these three variables. This recommended extracting only one factor, which measures the sustainability performance of the SMEs, explains 99.77% of the total variance, and is denoted in this study as SUSTAIN_PERF.

We assessed the covariate TA (TECH_ADOP) using the item 'new and growing firms can afford the latest technology,' which is part of the National Expert Survey (NES). We recorded responses on a Likert scale ranging from one to five (one – very bad, five – very good). At least 36 national and regional experts per country fill out NES every two years. Then, harmonisation is conducted centrally to obtain reliable and comparative indicators (Global Entrepreneurship Monitor, 2022). As a control variable, we considered the output gap (OUTPUT_GAP) defined as the GDP per capita of a given country relative to the GDP of Germany (Eurostat, 2023). Previous studies have already used a similar measure (*e.g.* Mendi, 2007).

Table 1 shows the panel series and dummy variables used in the analysis. Panel series include the two dependent variables (MARKET_PERF, SUSTAIN_PERF), the covariate TECH_ADOP and the control variable OUTPUT_ GAP. We created dummy variables for regions to capture the effect of the new EU Member States (NEW_EU _MEMB_D), Baltic (BALTIC_D) and Central European (CENT_EUR_D) regions. According to the European Innovation Scoreboard, these countries have less robust national innovation systems than their Western European counterparts. Following Mendi (2007) and Li *et al.* (2022) missing data are interpolated using the nearest observations.

Table 2 reports the descriptive statistics of the panel series and dummy variables. The total number of observations for each variable was 168 whereby it is a balanced panel embracing the 12 European Union and OECD member countries for the examined 14 years. Among these 12 countries, three were Baltic and three – Central European ones that joined the EU in 2004.

Table 1. Description of variables

Variable	Description
Panel-series	
MARKET_PERF	Market performance is defined as the sales of goods and services that are new to the market and new to the firm as a proportion of turnover.
SUSTAIN_PERF	Sustainability performance created using FA.
TECH_ADOP	New and growing firms can afford the latest technology (Likert scale 1-5).
OUTPUT_GAP	GDP per capita of a given country relative to the GDP of Germany.
Dummy variable	
NEW_EU_MEMB_D	Dummy variable for new EU members: Estonia, Latvia, Lithuania, Hungary, Czech Republic and Poland.
BALTIC_D	Dummy variable for Baltic countries: Estonia, Latvia and Lithuania.
CENT_EUR_D	Dummy variable for Central European countries: Hungary, Czech Republic and Poland.

Source: own study.

Table 2. Descriptive statistics (n=168)

Variable	Mean	Median	Standard deviation	Minimum	Maximum
Panel-series					
MARKET_PERF	10.263	10.426	3.452	1.422	18.668
SUSTAIN_PERF	0	-0.0601	0.882	-1.861	1.803
TECH_ADOP	2.287	2.243	0.358	1.666	3.817
OUTPUT_GAP	-9 058	-8 305	14 307.6	-28 055	14 199
Dummy variable					
NEW_EU_MEMB_D	0.5	-	0.5	0	1
BALTIC_D	0.25	-	0.43	0	1
CENT_EUR_D	0.25	-	0.43	0	1

Source: own study in R.

Model Specification

We analysed the impact of the TA of the SMEs on their performance in two specifications. The first one (1) explores the long-run relationship between TA (TECH_ADOP) and market performance (MARKET_PERF) using the econometric model:

$$\text{MARKET\_PERF}_{it} = \beta_0 + \beta_1\,\text{TECH\_ADOP}_{it} + \beta_2\,\text{OUTPUT\_GAP}_{it} + \varepsilon_{it} \quad (1)$$
$$i = 1, \dots, N = 12 \ \ (\text{country}) \qquad t = 1, \dots, T = 14 \ \ (\text{time})$$

in which i represents the cross-sectional units (in this study, countries) and t is the time index.

We further examined the impact of TA on market performance by creating a dummy variable for new EU Members States (NEW_EU_MEMB_D) that we further divided into Baltic (BALTIC_D) and Central European countries (CENT_EUR_D). We then formed TECH_ADOP as an interaction variable with each of these dummies.

The second model explored the long-run relationship between TA and sustainability performance using a similarly structured model.

RESULTS AND DISCUSSION

We investigated long-run relationships using a four-stage procedure. The first stage evaluated the presence of cross-sectional dependence across units – in our context countries – using four tests: (a) the Lagrangian Multiplier (LM) test; (b) the Scaled version of the Lagrangian Multiplier (SLM) test; (c) the Bias-Corrected and scaled Lagrangian Multiplier (BCLM) test, and (d) the CD test. The tests are implemented in *plm* package in *R*. The second stage explores the presence of unit roots. Based on the positive evidence of the presence of cross-sectional dependence, we used the Cross-sectionally augmented Im, Pesaran and Shin (CIPS) test. The CIPS, implemented in *plm* package in *R*, belongs to the second generation of unit root tests capable of detecting panel unit roots under conditions of cross-sectional dependence. In

the third stage, we investigated the existence of long-run or cointegrating relationships. We evaluated cointegration using Pedroni's test implemented in *pco* package in *R*. At the fourth stage, based on positive evidence of the long-run relationship of our panel-series, we calculated the dynamic ordinary least squares (DOLS) estimators, as implemented in *cointReg* package in *R*. Figure 1 graphically presents the complete methodological framework, which fits with the approach of recent publications in the field of economics, finance, and energy (*e.g.* Petrović & Lobanov, 2022; Espoir & Ngepah, 2021).

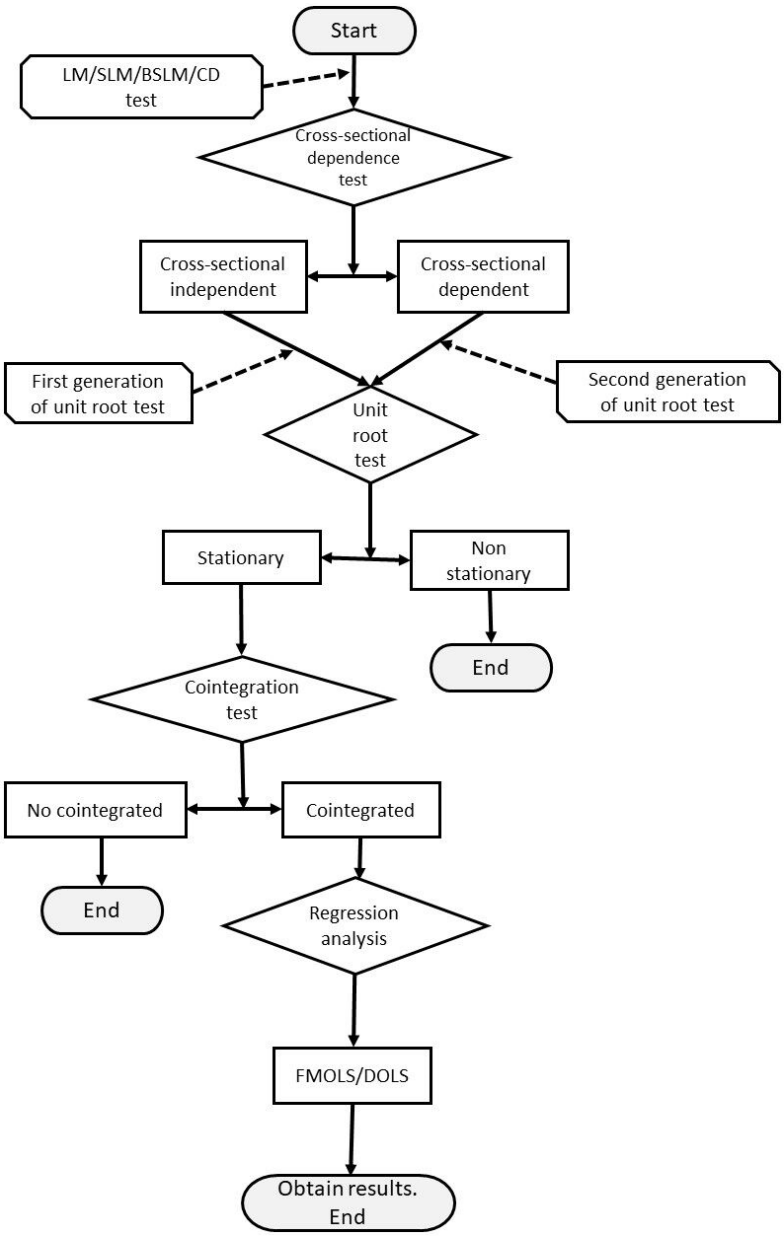

Figure 1. Methodological framework
Source: own elaboration.

Cross-sectional Dependence Test

We started the analysis by evaluating the presence of cross-sectional dependence across countries, that is, the possible dependence of ε_{it} across i's. The source of cross-sectional dependence can either be the relative position of the countries (spatial dependence), where neighbouring countries may be more strongly related than far away ones, or it is based on common factors – whether observable or not– that affect the countries irrespective of their relative position (Croissant & Millo, 2019). Ignoring cross-sectional dependence can lead to several consequences, which encompass inefficient and inconsistent

parameter estimates and heteroskedasticity, all of which collectively compromise the validity of hypothesis-testing inferences. Cross-sectional dependence can be evaluated using the null hypothesis H_0: $\rho_{ij} = cor(\varepsilon_{it}, \varepsilon_{jt}) = 0$ for $i \neq j$, where ρ_{ij} is the ij-th estimated sample cross-correlation coefficient defined as

$$\hat{\rho}_{ij} = \hat{\rho}_{ji} = \frac{\sum_{t=1}^{T} \hat{\varepsilon}_{it}\hat{\varepsilon}_{jt}}{\sqrt{\sum_{t=1}^{T} \hat{\varepsilon}_{it}^2} \sqrt{\sum_{t=1}^{T} \hat{\varepsilon}_{jt}^2}} \quad \text{for each pair of countries } (i, j),\ i \neq j \tag{2}$$

$\hat{\varepsilon}_{it}$ being the ordinary least squares (OLS) residual estimated for each country i using *T* sample observations.

We considered the four different test statistics mentioned earlier for evaluating H_0, whose mathematical expressions and distributions under H_0 are available upon request.

The cross-sectional dependence tests within each panel series (details available upon request) strongly confirm the presence of cross-sectional dependence among countries. Accordingly, we followed the logic of Figure 1 and applied the second generation of the unit root tests as described in the following subsection.

Panel Unit Root Test

This step explores the presence of unit roots considering the cross-sectional dependence present in the panel series. We explored the existence of unit roots using the CIPS test (Im *et al.*, 2003; Pesaran, 2007), in which the null hypothesis was H_0 = the panel-series contains a unit root and is non-stationary. In general, panel series are expected to be stationary at the level I(0) or first difference I(1), thus entailing the rejection of H_0. The presence of unit roots can lead to estimation problems, giving rise to issues such as spurious regressions and endogeneity concerns.

Table 3 reveals that our panel series were non-stationary at their levels. However, they became stationary in their first differences under the model with a constant. Our panel series were integrated of order one, therefore, we proceed with the following stage of cointegration.

Table 3. Panel unit root test results

Variables	Constant	
Panel-series	Level	First difference
MARKET_PERF	-0.57(0.2)	-2.44(0.06)*
SUSTAIN_PERF	-1.73(0.2)	-3.60(0.00)***
TECH_ADOP	-1.51(0.2)	-3.19(0.00)***
OUTPUT_GAP	-1.98(0.2)	-3.153(0.06)*

Note(s): *p <0.01; **p <0.05; ***p < 0.001. We indicated cases when the p-value was greater than 0.1 or smaller than 0.001 as 0.2 and 0.00, respectively.
Source: own study in *R*.

Panel Cointegration Test

The next step was to investigate the presence of a long-run relationship between the dependent variable and the panel series. In econometrics, scholars commonly refer to this phenomenon as cointegration. Cointegration implies a long-term relationship between variables, enabling the estimation of valid long-term parameters and providing meaningful interpretations of relationships. Conversely, employing non-cointegrated variables can give rise to the occurrence of spurious regression. We employed Pedroni's cointegration test, as previously conducted by other studies (*e.g.* Espoir & Ngepah, 2021), to test the null hypothesis of no cointegration (Pedroni, 1999).

Pedroni's test uses seven types of statistics grouped into two categories: panel (or within-dimension-based) statistics and group mean (or between-dimension-based) statistics. The decision to reject H_0 is taken based on the significance of most of the statistics. Under the alternative hypothesis (H_1), the panel variance statistic (denoted in Table 4 as panel-υ statistic) diverges to positive infinity. Consequently, we used the right tail of the normal distribution to reject H_0. For each of the other six

test statistics, we used the left tail of the normal distribution with large negative values to reject H_0. Table 4. Presents the results of the seven test statistics, integrated with the applied regression models from Table 5. Based on these results, we concluded that our panel series are cointegrated, indicating the existence of a long-run relationship.

Table 4. Panel cointegration test results

Statistic	Model 1-4	Model 5-8
Within-dimension		
panel *υ*-statistic	63.91(0.0)***	0.52(0.3015)
panel *ρ*-statistic	-14.53(0.0)***	-7.49(0.0)***
panel *t*-statistic (non-parametric)	-4.16(0.0)***	-2.06(0.0197)***
panel *t*-statistic (parametric)	-2.42(0.0078)***	-113.32(0.0)***
Between-dimension		
group *ρ*-statistic	-14.03(0.0)***	-8.88(0.0)***
group *t*-statistic (non-parametric)	-3.89(0.0)***	-2.66(0.0039)***
group *t*-statistic (parametric)	-3.38(0.0)***	-2.81(0.0025)***

Note(s): *p <0.01; **p <0.05; ***p < 0.001.
Source: own study in *R*.

Long-run Relationships via DOLS Estimation

After establishing the cointegration relationships, we could estimate the long-run parameters using various econometric techniques, including ordinary least squares, dynamic ordinary least squares (DOLS), or fully modified least squares (FMOLS) estimators. Kao and Chiang (2001) demonstrated the superiority of DOLS over other estimators for estimating cointegrated panel regressions, justifying its adoption in this study.

Table 5 reports the positive and highly significant (at the 1% level) long-run estimates of TA in SMEs on their country-level market performance in Models 1-4. These findings lend support to H1. Based on the estimate from Model 1, a 1% increase in TA is associated with an approximate 4.578% increase in market performance.

For H3a, there was a mixed support. The results indicate that the impact of TA by the SME population on market performance varies across the regional contexts under examination. It exhibits a negative and statistically significant effect in the Baltic countries, while in Central European countries, the effect is positive and statistically significant. Specifically, the elasticity of market performance with respect to TA in Central European (Baltic) countries was 2.377 (-2.004), meaning that a 1% increase in the measure of TA resulted in 2.377% (2.004%) increase (decrease) in their market performance.

Interestingly, the control variable OUTPUT_GAP appears to be significant only in Model 4 , as exemplified by the positive sign and its 5% significance level. This result indicates that a 1% increase in the GDP per capita lag behind the GDP of Germany increases market performance by 0.0001% which is fairly negligible.

Models 5-8 report the long-run estimates of TA in the SMEs on their sustainability performance. The variable of TA is again highly significant at a 1% level in all models. This indicates that, drawing from the estimate from Model 5, the elasticity of sustainability performance with respect to TA is 0.173, meaning that a 1% increase in TA results in a 0.173% increase in sustainability performance for the European SMEs under study, confirming H2. However, the regional dummies do not reach conventional levels of significance, but their combined covariate captured by NEW_EU_MEMB_D remarkably does. Derived from parameter estimates in Model 6, the elasticity of the interaction variable is calculated to be -0.607. This result implies that a 1% increase in the interaction of TA with the newer EU member states leads to a 0.607% decrease in the sustainability performance of their SMEs in comparison to the old EU members, thus providing empirical support for H3b.

Noteworthy, the coefficient of TA is much larger for market performance compared to sustainability performance (4.578 in Model 1 vs. 0.173 in Model 5) which signals the much larger impact of TA by SMEs towards the traditional performance measure.

One may observe the positive and significant parameter estimate for OUTPUT_GAP for sustainability performance in Models 5, 7, and 8 in Table 5. The estimates of Model 5 indicate that a 1% increase in the GDP per capita lag behind the GDP of Germany increases sustainability performance by 0.00005%, constituting a relatively modest impact.

Table 5. Panel DOLS result

Dependent variable: MARKET_PERF								
Variables	Model 1		Model 2		Model 3		Model 4	
	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.
TECH_ADOP	4.578***	11.7	4.713***	8.2	4.878***	12.8	4.429***	12.8
TECH_ADOP × NEW_EU_MEMB_D	–		-0.726	-0.3	-		–	
TECH_ADOP × BALTIC_D	–		–		-2.004**	-2.1	–	
TECH_ADOP × CENT_EUR_D	–		–		–		2.377**	2.6
OUTPUT_GAP	0.00004	0.7	-0.00002	-0.09	-0.00003	-0.43	0.0001**	2.0
Optimal number of lags	0		0		5		5	
Optimal number of leads	2		2		4		4	
Kernel for the long-run variance	Barlett kernel		Barlett kernel		Barlett kernel		Barlett kernel	
Bandwidth for the long-run variance	Andrews, 1991		Andrews, 1991		Andrews, 1991		Andrews, 1991	
Dependent variable: SUSTAIN_PERF								
Variables	Model 5		Model 6		Model 7		Model 8	
	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.
TECH_ADOP	0.173***	2.7	0.286***	3.8	0.1905***	3.1	0.171***	2.7
TECH_ADOP × NEW_EU_MEMB_D	–		-0.607**	-2.1	–		–	
TECH_ADOP × BALTIC_D	–		–		-0.139	-1.02	–	
TECH_ADOP × CENT_EUR_D	–		–		-		0.037	0.2
OUTPUT_GAP	0.00005***	5.4	0.0000004	0.01	0.00004***	4.2	0.00005***	4.5
Optimal number of lags	0		0		0		0	
Optimal number of leads	0		0		0		0	
Kernel for the long-run variance	Barlett kernel		Barlett kernel		Barlett kernel		Barlett kernel	
Bandwidth for the long-run variance	Andrews, 1991		Andrews, 1991		Andrews, 1991		Andrews, 1991	

Note(s): *p <0.01; **p <0.05; ***p < 0.001. Optimal number of lags and leads based on the AIC.
Source: own study in *R*.

CONCLUSIONS

Study Contributions

The primary objective of this article is to contribute to the literature, which predominantly focuses on the effects of TA at the company or industry level, by examining the impact of TA by SMEs within the broader context of SMEs at the national level. Moreover, we aimed to shed light on whether the TA-performance link is contingent upon the innovation potential of the region where a country's SMEs are situated.

Our results unveiled a positive relationship between TA and market performance at the country level. However, long-run equilibrium relationships also demonstrate that these effects differ among the new EU member countries, resulting in a positive effect for Central European countries and a negative effect for Baltic countries. Noteworthy, both Central European and Baltic countries are considered innovation-laggard regions compared to the sampled Western European countries. This disparity can partly be attributed to differences in industry structures. The Baltic countries demonstrate a higher proportion of high-tech ICT industries, whereas the Central European economies, particularly within their SMEs, tend to be more oriented towards traditional manufacturing industries.

Furthermore, our study confirmed the positive impact of TA on sustainability performance within European SMEs at the country level. However, this effect appears to be detrimental to a specific group of countries, namely the new member countries comprised of Baltic and Central European states, when compared to the older EU member states. One plausible explanation for this

disparity could be the relatively weaker ESG mentality among practising managers in the SMEs within this group of countries, which may hinder their ability to harness TA effectively for the improvement of their firm's sustainability performance.

Furthermore, our findings underscore a noteworthy trend: TA has a significantly greater impact on market performance than sustainability performance. This observation calls for a substantial shift in both governmental and corporate policies that encourages and supports deeper commitment by SMEs to technology-driven green transition initiatives.

Implications for Policymakers

Several implications emerge from the results. The study highlights the positive impact of TA on sustainability performance, underlining the importance of ESG principles for combating polluting industries and political allies (consider the case of the US – Lippman, 2023). Hence, TA within SMEs can play a pivotal role in mitigating populist arguments against green economic transitions. Nevertheless, governments incentivise to SMEs and establish a favourable regulatory environment to facilitate the adoption of environmentally friendly technologies (Khalilov & Yi, 2021).

We also found that the SMEs of newer EU member countries tend to follow a rigid pathway when adopting technologies to benefit from the green transition. Therefore, the EU should focus more on direct policies tailored to the development of SMEs. The innovation management literature neatly documents the existence of a sophisticated network of R&D centres or science parks in Western Europe (the Netherlands – Duc & Lindeque, 2018; Sweden – Löfsten & Lindelöf, 2005; Belgium – Spithoven *et al.*, 2011) that directly help local SMEs to co-develop advanced technologies for for-profit reasons. Such a dedicated initiative backed by EU funding programs would be valuable for the newer Member States. This approach would definitely increase the effectiveness of REPowerEU policy (Bernat *et al.,* 2023) by involving the SME sector more in developing and adopting green technologies that foster the transition to a carbon-free economic structure. As we also identified the relative inability of the Baltic states to turn TA into positive market performance, establishing a well-oiled network of R&D centres could assist in this regard.

Implications for Managers and Practitioners

Researchers interested in elaborating more precise steps tailored around our framework might explore how specific technology access strategies influence technology adoption and their combined impact on performance in the context of SMEs at the country level.

Our results demonstrate that company managers at Baltic firms lag behind their Central and Western European counterparts in turning TA into market success. Aside from the differences in industry structure that favour emerging ICT fields, they may lack complementary assets to ensure the profitable market applications of their technologies. Among other solutions, managers attempt to create patents and trademarks as integral elements of a technology management strategy, thereby enhancing their market positions (Fosfuri *et al.*, 2008). Results also show that the SMEs of the Baltic and Central European states, compared to those of Western Europeans, are laggards in terms of using TA to achieve robust sustainability performance. Managers can improve attentional engagement in firms and the development of technologies with positive environmental impact, focusing on problem-solving, sensemaking, and decision-making (Ocasio, 2011). Moreover, SME managers in new Member States should focus on open innovation (Colombo *et al*., 2014), licensing strategies (Smallbone *et al.*, 2022), and dynamic capabilities to enhance their adaptability, performance, and evolutionary fit (Teece, 2007). These tools may help SMEs access lacking innovation inputs, combat organisational myopia, enhance their technology and product market strategies, and adapt to changing market conditions (van de Vrande *et al*., 2009; Levinthal & March, 1993; Weaven *et al*., 2021).

Limitations and Future Research

The research has some shortcomings that represent an opportunity for further study. The collected data are secondary data that come from different databases. Data collection and aggregation procedures varied among countries. However, Eurostat, OECD or the Global Entrepreneurship Monitor supervised them through quality control processes. The results of the present study indicate that a newly designed and

exhaustive survey with a set of complementary items, like the one used for the community innovation survey should be issued to European SMEs in the future to boost representativity and comparison. The use of causality tests is advisable to gain further insights into the relationships of panel series.

REFERENCES

Ahmed, W., Najmi, A., & Ikram, M. (2020). Steering firm performance through innovative capabilities: A contingency approach to innovation management. *Technology in Society, 63*, 101385. https://doi.org/10.1016/j.techsoc.2020.101385

Andrews, D.W.K. (1991). Heteroskedasticity and autocorrelation consistent covariance matrix estimation. *Econometrica, 59*(3), 817-858. https://doi.org/10.2307/2938229

Bernat, T., Gąsior, A., Lisowska, R., Szymańska, K., & Zaharia, R. (2023). Involvement's barriers of micro and small firms into EU energy transition. *Amfiteatru Economic, 25*(63), 541-556. http://dx.doi.org/10.24818/ea/2023/63/541

Berrone, P., Fosfuri, A., Gelabert, L., & Gomez-Mejia, L.R. (2013). Necessity as the mother of 'green' inventions: institutional pressures and environmental innovations. *Strategic Management Journal*, *34*(8), 891-909. https://doi.org/10.1002/smj.2041

Bhatia, M.S., & Kumar, S. (2023). An empirical analysis of critical factors of Industry 4.0: A contingency theory perspective. *International Journal of Technology Management, 91*(1-2), 82-106. https://doi.org/10.1504/ijtm.2023.10052651

Chege, S.M., Wang, D., & Suntu, S.L. (2020). Impact of information technology innovation on firm performance in Kenya, *Information Technology for Development*, *26*(2), 316-345. https://doi.org/10.1080/02681102.2019.1573717

Chen, Y.-T., Sun, E.W., & Lin, Y.-B. (2020). Merging anomalous data usage in wireless mobile telecommunications: business analytics with a strategy-focused data-driven approach for sustainability. *European Journal of Operational Research*, *281*(3), 687-705. https://doi.org/10.1016/j.ejor.2019.02.046

Cieślik, A., Michałek, J., & Szczygielski, K. (2016). Innovations and Export Performance: Firm-level Evidence from Poland. *Entrepreneurial Business and Economics Review, 4*(4), 11-28. https://doi.org/10.15678/EBER.2016.040402

Colombo, M.G., Piva, E., & Rossi-Lamastra, C. (2014). Open innovation and within-industry diversification in small and medium enterprises: The case of open source software firms. *Research Policy*, *43*(5), 891-902. https://doi.org/10.1016/j.respol.2013.08.015

Croissant, Y., & Millo, G. (2019). *Panel Data Econometrics with R*. Hoboken, NJ: Wiley Online Library. https://doi.org/ 10.1002/9781119504641

Czerny, A., & Letmathe, P. (2017). Eco-efficiency: GHG reduction related environmental and economic performance. The case of the companies participating in the EU Emissions Trading Scheme, *Business Strategy and the Environment, 26*(6), 791-806. https://doi.org/10.1002/bse.1951

Dangelico, R.M., Pujari, D., & Pontrandolfo, P. (2017). Green product innovation in manufacturing firms: A sustainability-oriented dynamic capability perspective. *Business Strategy and the Environment*, *26*(4), 490-506. https://doi.org/10.1002/bse.1932

De Pedraza Garcia, P., & Anastasis, K. (2022). *Monitoring SMEs' performance in Europe*. EUR 31175 EN, Luxembourg: Publications Office of the European Union. https://doi.org/10.2760/029214

Duc, N. le, & Lindeque, J. (2018). Proximity and multinational enterprise co-location in clusters: A multiple case study of Dutch science parks. *Industry and Innovation*, *25*(3), 282-307. https://doi.org/10.1080/13662716.2017.1355230

Espoir, D.K., & Ngepah, N. (2021). Income distribution and total factor productivity: A cross-country panel cointegration analysis. *International Economics and Economic Policy*, *18*, 661-698. https://doi.org/10.1007/s10368-021-00494-6

European Commission. (2003). *Commission Recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises*. Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32003H0361 on December 19, 2023.

European Commission. (2022). *SMEs and Green markets Eurobarometer survey results*. Retrieved from https://europa.eu/eurobarometer/surveys/browse/all/series/17833 on May 20, 2023.

European Commission. (2023). *Flash Eurobarometer FL498 : SMEs, resource efficiency and green markets. Metadata quality*. Retrieved from https://data.europa.eu/data/datasets/s2287_fl498_eng/quality?locale=en on December 19, 2023.

Eurostat. (2022a). *Annual enterprise statistics by size class for special aggregates of activities*. Retrieved from https://ec.europa.eu/eurostat/databrowser/product/view/SBS_SC_SCA_R2 on April 24, 2023.

Eurostat. (2022b). *Community innovation survey microdata*. Data online codes: inn_cis7-12. Retrieved from https://ec.europa.eu/eurostat/web/microdata/community-innovation-survey on May 20, 2023.

Eurostat. (2022c). *Environmental protection expenditure by size class*. Retrieved from https://ec.europa.eu/eurostat/databrowser/view/sbs_env_sc_r2/default/table on April 24, 2023.

Eurostat. (2023). *Real GDP per capita*. Retrieved from https://ec.europa.eu/eurostat/databrowser/view/sdg_08_10/default/table?lang=en on July 10, 2023.

Fatemi, A., Glaum, M., & Kaiser, S. (2018). ESG performance and firm value: The moderating role of disclosure. *Global Finance Journal*, *38*, 45-64. https://doi.org/10.1016/j.gfj.2017.03.001

Filippetti, A., & Guy, F. (2020). Labor market regulation, the diversity of knowledge and skill, and national innovation performance. *Research Policy, 49*(1), 103867. https://doi.org/10.1016/j.respol.2019.103867

Flammer, C., & Kacperczyk, A. (2016). The impact of stakeholder orientation on innovation: Evidence from a natural experiment. *Management Science*, *62*(7), 1982-2001. https://doi.org/10.1287/mnsc.2015.2229

Fosfuri, A., Giarratana, M.S., & Luzzi, A. (2008). The penguin has entered the building: The commercialization of open source software products. *Organization Science*, *19*(2), 292-305. https://doi.org/10.1287/orsc.1070.0321

Fuentelsaz, L., Gómez, J., & Palomas, S. (2009). The effects of new technologies on productivity: An intrafirm diffusion-based assessment. *Research Policy*, *38*(7), 1172-1180. https://doi.org/10.1016/j.respol.2009.04.003

Gangwar, H., Mishra, R., & Kamble, S. (2023). Adoption of big data analytics practices for sustainability development in the e-commerce supply chain: A mixed-method study. *International Journal of Quality & Reliability Management*, *40*(4), 965-989. https://doi.org/10.1108/ijqrm-07-2021-0224

Global Entrepreneurship Monitor. (2022). *Interpreting NES data*. Retrieved from http://gem-consortium.ns-client.xyz/about/wiki on August 18, 2023.

Greve, H.R., & Seidel, M.-D.L. (2014). The thin red line between success and failure: Path dependence in the diffusion of innovative production technologies. *Strategic Management Journal*, *36*(4), 475-496. https://doi.org/10.1002/smj.2232

Guo, L., Ling, Qu, Y., & Tseng, M.-L. (2017). The interaction effects of environmental regulation and technological innovation on regional green growth performance. *Journal of Cleaner Production*, *162*, 894-902. https://doi.org/10.1016/j.jclepro.2017.05.210

Hossain, M.I., San, O.T., Ling, S.M., & Said, R.M. (2020). The role of environmental awareness and green technological usage to foster sustainable green practices in Bangladeshi manufacturing SMEs*. International Journal of Advanced Science and Technology, 29*(7S), 3115-3124. https://doi.org/10.47836/pjssh.30.1.14

Im, K.S., Pesaran, M.H., & Shin, Y. (2003). Testing for unit roots in heterogeneous panels. *Journal of Econometrics*, *115*(1), 53-74. https://doi.org/10.1016/s0304-4076(03)00092-7

Jalil, M.H., Ali, A., & Kamarulzaman, R. (2022). Does innovation capability improve SME performance in Malaysia? The mediating effect of technology adoption. *The International Journal of Entrepreneurship and Innovation*, *23*(4), 253-267. https://doi.org/10.1177/14657503211048967

Kao, C., & Chiang, M.-H. (2001). On the estimation and inference of a cointegrated regression in panel data. In B. Baltagi, T. Fomby & H. Carter (Eds.) *Nonstationary panels, panel cointegration, and dynamic panels*. *Advances in Econometrics*, (vol. 15, pp. 179-222). https://doi.org/10.1016/s0731-9053(00)15007-8

Khalilov, L., & Yi, C.-D. (2021). Institutions and entrepreneurship: Empirical evidence for OECD countries. *Entrepreneurial Business and Economics Review, 9*(2), 119-134. https://doi.org/10.15678/EBER.2021.090208

Kumar, A., & Ayedee, N. (2021). Technology adoption: A solution for SMEs to overcome problems during COVID-19, Forthcoming, *Academy of Marketing Studies Journal*, *25*(1).

Levinthal, D.A., & March, J.G. (1993). The myopia of learning. *Strategic Management Journal, 14*(S2), 95-112, https://doi.org/10.1002/smj.4250141009

Li, W., Qiao, Y., Li, X., & Wang, Y. (2022). Energy consumption, pollution haven hypothesis, and Environmental Kuznets Curve: Examining the environment-economy link in belt and road initiative countries. *Energy*, *239*, 122559. https://doi.org/10.1016/j.energy.2021.122559

Lippman, D. (2023). The 'CEO of Anti-Woke Inc.' has his eye on the presidency. *Politico*, February 13, 87680-87691.

Löfsten, H., & Lindelöf, P. (2005). R&D networks and product innovation patterns—academic and non-academic new technology-based firms on Science Parks. *Technovation, 25*(9), 1025-1037. https://doi.org/10.1016/j.technovation.2004.02.007

Maqsood, S., Zhou, Y., Lin, X., Huang, S., Jamil, I., & Shahzad, K. (2022). Critical success factors for adopting green supply chain management and clean innovation technology in the small and medium-sized enterprises: A structural equation modelling approach. *Frontiers in Psychology*, *13*, 1-16. https://doi.org/10.3389/fpsyg.2022.1008982

Marcon Nora, G.A., Alberton, A., & Ayala, D.H.F. (2023). Stakeholder theory and actor-network theory: The stakeholder engagement in energy transitions. *Business Strategy and the Environment*, *32*(1), 673-685. https://doi.org/10.1002/bse.3168

Mendi, P. (2007). Trade in disembodied technology and total factor productivity in OECD countries. *Research Policy*, *36*(1), 121-133. https://doi.org/10.1016/j.respol.2006.09.028

Muller, P., Ladher, P., Booth J., Mohamed, S., Gorgels, S., Priem M., Blagoeva, T., Martinelle, A., & Milanesi, G. (2022). *Annual report on European SMEs 2021/2022 SMEs and environmental sustainability. Background document, April 2022.* Luxembourg: Publications Office of the European Union.

Mustafa, H.K., & Yaakub, S. (2018). Innovation and technology adoption challenges: Impact on SMEs company performance. *International Journal of Accounting, Finance and Business*, *3*(15), 57-65.

Niehm, L.S., Tyner, K., Shelley, M.C., & Fitzgerald, M.A. (2010). Technology adoption in small family-owned businesses: Accessibility, perceived advantage, and information technology literacy. *Journal of Family and Economic Issues*, *31*(4), 498-515. https://doi.org/10.1007/s10834-010-9197-0

Ocasio, W. (2011). Attention to attention, *Organization Science*, *22*(5), 1286-1296. https://doi.org/10.1287/orsc.1100.0602

OECD (2022). *Green Growth Indicators*. Retrieved from https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH on April, 24 2023.

Octavia, A., Indrawijaya, S., Sriayudha, Y., Heriberta, M.E., Hasbullah, H., & Asrini, A. (2020). Impact on E-commerce adoption on entrepreneurial orientation and market orientation in business performance of SMEs. *Asian Economic and Financial Review*, *10*(5), 516-525. https://doi.org/10.18488/journal.aefr.2020.105.516.525

Pappas, I.O., Mikalef, P., Giannakos, M.N., Krogstie, J., & Lekakos, G. (2018). Big data and business analytics ecosystems: Paving the way towards digital transformation and sustainable societies. *Information Systems and E-Business Management*, *16*(3), 479-491. https://doi.org/10.1007/s10257-018-0377-z

Pedroni, P. (1999). Critical values for cointegration tests in heterogeneous panels with multiple regressors. *Oxford Bulletin of Economics and Statistics, 61*(S1), 653-670. https://doi.org/10.1111/1468-0084.61.s1.14

Pesaran, M.H. (2007). A simple panel unit root test in the presence of cross-section dependence. *Journal of Applied Econometrics*, *22*(2), 265-312. https://doi.org/10.1002/jae.951

Pesaran, M.H. (2015). *Time series and panel data econometrics*. Oxford: Oxford University Press.

Petrović, P., & Lobanov, M.M. (2022). Energy intensity and foreign direct investment nexus: Advanced panel data analysis. *Applied Energy, 311*, 118669. https://doi.org/10.1016/j.apenergy.2022.118669

Pinto, L. (2020). Green supply chain practices and company performance in Portuguese manufacturing sector. *Business Strategy and the Environment*, *29*(5), 1832-1849. https://doi.org/10.1002/bse.2471

Rosli, M.M., & Sidek, S. (2013). The Impact of innovation on the performance of small and medium manufacturing enterprises: Evidence from Malaysia. *Journal of Innovation Management in Small & Medium Enterprises*, *2013*, 1-16. https://doi.org/10.5171/2013.885666

Saikkonen, P. (1991). Asymptotically efficient estimation of cointegration regressions. *Econometric Theory*, *7*(1), 1-21. https://doi.org/1017/s0266466600004217

Salah, O.H., Yusof, Z.M., & Mohamed, H. (2021). The determinant factors for the adoption of CRM in the Palestinian SMEs: The moderating effect of firm size. *PloS One*, *16*(3), e0243355. https://doi.org/10.1371/journal.pone.0243355

Sebrek, S.S. (2015). Managing organisations in Schumpeterian environments: Intra-industry diversification through strategic technology alliances and patents. *Technology Analysis & Strategic Management, 27*(2), 161-181. https://doi.org/10.1080/09537325.2014.954536

Sebrek, S.S. (2020). Overlap in external technology search locations and the breadth of IPR assets: Lessons from the Security Software Industry. *Industry and Innovation, 27*(1-2), 105-133. https://doi.org/10.1080/13662716.2019.1588710

Semenova, V., Sebrek, S.S., Garrido, B.P., Katona, A., & Michalkó, G. (2023). The interaction of actor-independent and actor-dependent factors in new venture formation: The case of blockchain-enabled entrepreneurial firms. *Acta Oeconomica*. Online first. https://doi.org/10.1556/032.2023.00001

Smallbone, D., Saridakis, G., & Abubakar, Y.A. (2022). Internationalisation as a stimulus for SME innovation in developing economies: Comparing SMEs in factor-driven and efficiency-driven economies. *Journal of Business Research*, *144*, 1305-1319. https://doi.org/10.1016/j.jbusres.2022.01.045

Spithoven, A., Clarysse, B., & Knockaert, M. (2011). Building absorptive capacity to organise inbound open innovation in traditional industries. *Technovation*, *31*(1), 10-21. https://doi.org/10.1016/j.technovation.2010.10.003

Srinivasan, R., & Swink, M. (2018). An investigation of visibility and flexibility as complements to supply chain analytics: An organizational information processing theory perspective. *Production and Operations Management*, *27*(10), 1849-1867. https://doi.org/10.1111/poms.12746

Teece, D.J. (2007). Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal*, *28*(13), 1319-1350. https://doi.org/10.1002/smj.640

Torrent-Sellens, J., Díaz-Chao, Á., Miró-Pérez, A.-P., & Sainz, J. (2022). Towards the Tyrell corporation? Digitisation, firm-size and productivity divergence in Spain. *Journal of Innovation & Knowledge*, *7*(2), 100185. https://doi.org/10.1016/j.jik.2022.100185

van de Vrande, V., de Jong, J.P.J., Vanhaverbeke, W. & de Rochemont, M. (2009). Open innovation in SMEs: trends, motives and management challenges. *Technovation, 29*(6-7), 423-437, https://doi.org/10.1016/j.technovation.2008.10.001

Wadood, F., Alsaikh, M., Akbar, F., & Mahmud, M. (2022). Adoption of open innovation and entrepreneurial orientation practices in Malaysian furniture industry. *Entrepreneurial Business and Economics Review*, *10*(2), 21-40. https://doi.org/10.15678/EBER.2022.100202

Weaven, S., Quach, S., Thaichon, P., Frazer, L., Billot, K., & Grace, D. (2021). Surviving an economic downturn: dynamic capabilities of SMEs. *Journal of Business Research, 128*, 109-123, https://doi.org/ 10.1016/j.jbusres.2021.02.009

Xu, Z., Ge, Z., Wang, X., & Skare, M. (2021). Bibliometric analysis of technology adoption literature published from 1997 to 2020. *Technological Forecasting and Social Change*, *170*, 120896. https://doi.org/10.1016/j.techfore.2021.120896

Yacob, P., Wong, L.S., & Khor S.C. (2019). An empirical investigation of green initiatives and environmental sustainability for manufacturing SMEs. *Journal of Manufacturing Technology Management*, *30*(1), 2-25. https://doi.org/10.1108/jmtm-08-2017-0153

Ye, C., Song, X., & Liang, Y. (2022). Corporate sustainability performance, stock returns, and ESG indicators, fresh insights from EU member states. *Environmental Science and Pollution Research*, *29*(58), 87680-87691. https://doi.org/10.1007/s11356-022-20789-8

Zamani, S.Z. (2022). Small and Medium Enterprises (SMEs) facing an evolving technological era: a systematic literature review on the adoption of technologies in SMEs. *European Journal of Innovation Management*, *25*(6), 735-757. https://doi.org/10.1108/EJIM-07-2021-0360

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Acknowledgements and Financial Disclosure

The authors would like to thank the anonymous referees for their useful comments, that increased the value of this article.

Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Published by Krakow University of Economics – Krakow, Poland

Ministry of Education and Science
Republic of Poland

The journal is co-financed in the years 2022-2024 by the Ministry of Education and Science of the Republic of Poland in the framework of the ministerial programme "Development of Scientific Journals" (RCN) on the basis of contract no. RCN/SP/0583/2021/1 concluded on 13 October 2022 and being in force until 13 October 2024.

EBER
Entrepreneurial Business and Economics Review
2024, Vol. 12, No. 2
10.15678/EBER.2024.120207

The quality of institutions in shaping women's entrepreneurship: A perspective of European Union member states

Aleksandra Gaweł, Timo Toikko

ABSTRACT

Objective: The objective of the article is to investigate the influence of the quality of institutions on women's entrepreneurship from the perspective of European Union (EU) member countries. Quality of institutions is understood as a feature of a well-functioning society and it is considered from four dimensions.

Research Design & Methods: Based on the panel data for 27 EU member countries in the years 2009 to 2021, we estimate the model of women's entrepreneurship as a dependent variable and four dimensions of institutional quality as independent variables, namely, quality of public governance, quality of wealth distribution, quality of youth perspectives, and quality based on gender.

Findings: The results confirm the mixed effects of institutional quality in shaping women's entrepreneurship. Failures in quality of governance in the aspects of control of corruption, government effectiveness, political stability and absence of violence, and Gini coefficient, can push women into entrepreneurship instead of paid employment as necessity-driven motivators. Aspects of institutional quality such as gender-based political and managerial empowerment, citizens' voices and accountability, and inclusion of younger generations in society act as opportunity-driven enablers of women's entrepreneurship.

Implications & Recommendations: The mixed effects of the impact of the quality of institutions on women's entrepreneurship indicate the challenges in combining the goals of reaching well-structured societies and reducing the gender gap in entrepreneurship. To overcome these challenges, policymakers and other stakeholders should focus on opportunity-driven enablers of women's entrepreneurship such as gender-based political and managerial empowerment, citizens' voices and accountability, and inclusion of younger generations in the society.

Contribution & Value Added: The novelty of the article lies in the proposed various dimensions of institutional quality: quality of public governance, quality of wealth distribution, quality of youth perspectives, and based on gender. The research results contribute to the theory of entrepreneurship, institutional theory, and gender studies by investigating the impact of various dimensions of quality of institutions on women's entrepreneurship. The mixed explanatory power of institutional quality in shaping women's entrepreneurship is discovered, with respect to both the opportunity-driven enablers and the institutional failures impacting women.

Article type:	research article
Keywords:	women's entrepreneurship; quality of institutions; entrepreneurial enablers; European Union countries; panel regression
JEL codes:	L26, J16, O43

Received: 24 September 2023 Revised: 28 November 2023 Accepted: 12 December 2023

Suggested citation:
Gaweł, A., & Toikko, T. (2024). The quality of institutions in shaping women's entrepreneurship: A perspective of European Union member countries. *Entrepreneurial Business and Economics Review,* 12(2), 113-127. https://doi.org/10.15678/EBER.2024.120207

INTRODUCTION

Despite the progress made in achieving gender equality, entrepreneurship still exhibits a persistent gender gap (Delmar & Davidsson, 2000; Mustafa & Treanor, 2022; Ughetto *et al.*, 2020), and the explanation of women's entrepreneurship is often rooted in institutional theory (Gimenez-Jimenez *et al.*, 2020; Hägg *et*

al., 2023), particularly in informal institutions, regarding aspects such as national culture or gendered roles. Further, entrepreneurship is often seen as a stereotypically masculine occupation (Jones *et al.*, 2019; Williams & Patterson, 2019), which can act as a barrier preventing women from entering that domain.

The institutions play a pivotal role in shaping entrepreneurship at the societal level (Boudreaux & Nikolaev, 2019), and the quality of institutions, which refers to the well-functioning society (Thai & Turkina, 2014), creates the surroundings for entrepreneurs to operate in. The reason for exploring the role of institutions refers to the dual position of entrepreneurs: their autonomy as individual actors (Markowska *et al.*, 2019), and their interactions with the institutional environment during the entrepreneurial process (Su *et al.*, 2019). Following the narrow understanding of entrepreneurship as 'running one's own business' (Pardo & Ruiz-Tagle, 2017), we operationalised women's entrepreneurship in this article as the share of women among entrepreneurs as a whole (Gaweł & Mroczek-Dąbrowska, 2022).

To go beyond the state-of-the-art in understanding the societal impact, this article follows the recognition of different responses of women and men to the institutional environment (Dheer *et al*., 2019; Gaweł & Toikko, 2023), and aims to explore the influence of quality of institutions on women's entrepreneurship. We contribute to the field of entrepreneurship theory, institutional theory, and gender studies by implementing the various dimensions of quality of institutions, namely quality of public governance, quality of wealth distribution, quality of youth perspectives, and quality based on gender. These dimensions reflect both norms and values, as well as gender-neutral aspects of institutions, and aspects specifically related to women. By proposing different dimensions of institutional quality, we aim to respond to the suggestion of incorporating the interdependence of institutional conditions on women's entrepreneurship (Xie *et al.,* 2021). The main value added to this study lies in examining the impact of various dimensions of institutional quality on women's entrepreneurship. Based on panel data for the European Union (EU) member states, we investigated the significance of institutions' quality as predictors of women's entrepreneurship.

The remainder of the article proceeds as follows. It will begin with a review of the literature, which presents a theoretical discussion on institutions in shaping women's entrepreneurship, followed by an explanation of the research method. Subsequently, we will present the results, discuss them, and conclude with implications.

LITERATURE REVIEW

Institutions Underlying Entrepreneurship

The perspective of a sociological theorist, Talcott Parsons (1902-1979) (Parsons, 1956), regarding organisations as components of a broader social system, affirms the necessity for organisations to establish a suitable relationship with society (David *et al*., 2019; Meyer & Rowan, 1977).

Despite operating as independent agents, navigating uncertainty and subjective risk perceptions (Markowska *et al.*, 2019; Wach & Głodowska, 2022), entrepreneurs need to adjust to their societal environment. Consequently, the institutional context significantly influences entrepreneurial activity (Aparicio *et al.*, 2016; Saunoris & Sajny, 2017; Boudreaux & Nikolaev, 2019), and the diversity of entrepreneurship outcomes among countries can be explained by the differences in institutional contexts (Dilli *et al.*, 2018). When referring to Baumol's (1996) concept of types of entrepreneurship, in countries with weak institutions, unproductive or even destructive entrepreneurship dominates, while in countries with strong institutions, productive entrepreneurship dominates (Acs *et al*., 2018; Nair & Njolomole, 2020). Failures of formal institutions or the asymmetry between formal and informal institutions are related to the size of informal entrepreneurship (Williams & Bezeredi, 2018; Shahid *et al*., 2022).

In the realm of institutional theory, scholars examine entrepreneurship through various approaches (Scott, 1995), mainly in differentiating between formal and informal institutions (Omri, 2020), or within the regulative, normative, and cognitive pillars (Estrin & Mickiewicz, 2011). Scott (1995) identified three institutional pillars influencing entrepreneurial activity (Meyer & Rowan, 1977): the regulative pillar assumes entrepreneurs follow state-created rules, the normative pillar drives entrepreneurs to adhere to broader societal norms and values, and the cognitive pillar stems from observing and collectively participating in organisational behaviour, fostering entrepreneurs' interaction

with the society (Bosma *et al*., 2018). Another attitude towards institutions is their division into formal and informal, thus affecting entrepreneurship (Stiglitz, 2000). Specifically, formal institutions include rules and regulations established to shape the economic and legal structure of a society, while informal institutions encompass traditions, values, societal norms, and unwritten codes of behaviour (Estrin & Mickiewicz, 2011; Williams & Shahid, 2016; Wu & Li, 2019).

The existing norms and values, to which entrepreneurial endeavours conform, determine the legitimacy of the state in influencing entrepreneurship (Scott, 1995). Aspects such as the rule of law, political stability, the absence of violence, and accountability contribute to the quality of governance in a well-structured society, thereby fostering an environment that is conducive to entrepreneurship (Raza *et al*., 2019; Thai & Turkina, 2014; Stuchly *et al.*, 2023). Norms serve to establish societal predictability, a crucial facet of successful societies. Enhanced organisation within a society leads to better internalisation of its rules, thus fostering economic growth (Temple, 1999; Shchegolev & Hayat, 2018). Values are intertwined with social responsibility at the state level in varying ways (Esping-Andersen, 1998; Schwartz, 2012; Scruggs & Ramalho Tafoya, 2022).

Due to contributing to enhanced company productivity, reduced transaction costs, increased returns on investment, and reduced uncertainty levels (Dorożyński *et al*., 2020), the norms signifying the quality of governance are considered as predictors of entrepreneurship (Raza *et al.*, 2019). The relative costs and benefits of entrepreneurship can be influenced by values (Saunoris & Sajny, 2017), as these values affect the entrepreneurial environment (Bruton *et al.*, 2010). In turn, this impacts the comparative advantage of entrepreneurship versus paid employment.

Women's Entrepreneurship From an Institutional Perspective

Despite progress in achieving gender equality through enhanced women's workforce participation (Alsos *et al*., 2016; Madsen & Scribner, 2017), entrepreneurship still exhibits a consistent gender gap in many countries. Gender is a robust predictor of nascent entrepreneurship; in that, women are less likely to establish and run their own companies (Delmar & Davidsson, 2000; Mustafa & Treanor, 2022; Ughetto *et al*., 2020; Prabhu *et al*., 2023). Compared to male-led businesses, women's companies are predominantly smaller, have lower growth aspirations (Reichborn-Kjennerud & Svare, 2014), are less profitable, possess limited access to external financial capital (Coleman & Robb, 2009; Morazzoni & Sy, 2022; Pistilli *et al*., 2022), and operate within traditional women-dominated sectors (Damelang & Ebensperger, 2020; Gaweł & Mroczek-Dąbrowska, 2022). More often women are negatively motivated by necessity-driven factors rather than opportunity-driven factors when becoming entrepreneurs (Martínez-Rodríguez *et al*., 2022).

Although the multiple embeddedness of women when becoming entrepreneurs is recognised (Ojong *et al*., 2021), scholars often use institutional theory as a lens serving to explain the gender gap in entrepreneurship (Gimenez-Jimenez *et al.*, 2020; Hägg *et al.*, 2023; Noguera *et al.*, 2015; Webb *et al.*, 2020; Wu & Li, 2019). Perspectives on institutions are employed to explain women's participation in entrepreneurship, drawing from the regulatory, normative, and cognitive pillars of institutions (Bui *et al*., 2018), and the concept of formal and informal institutions (Wu & Li, 2019). The explanation that is most often used is 'stereotypes of entrepreneurship' but these stereotypes are associated with masculinity and individualism, and they are rooted in the perspective of national culture as an informal institution (Gimenez-Jimenez *et al.*, 2020; Jones *et al.*, 2019; Williams & Patterson, 2019; Xie *et al*. 2021). Gender-related stereotypes reduce women's participation in entrepreneurship (Anambane & Adom, 2018; Naguib & Jamali, 2015; Van Ewijk & Belghiti-Mahut, 2019). Gender differences in entrepreneurship are often attributed to women's domestic responsibilities (Pérez-Pérez & Avilés-Hernández, 2016). For instance, high fertility rates negatively affect women's entrepreneurship (Dutta & Mallick, 2018).

To go further with understanding the societal impact, we aimed to explore how women entrepreneurs adapt to the quality of institutions, by following the institutional framework to explain the gender gap in entrepreneurship. However, we went well beyond the commonly used context of national culture as an informal institution in explaining women's entrepreneurship (Anambane & Adom, 2018; Naguib & Jamali, 2015; Van Ewijk & Belghiti-Mahut, 2019), as well as the distinction between strong and weak institutions (Acs *et al*., 2018) and concepts of institutional failures (Williams & Bezeredi, 2018), and we explored the impact of institutions' quality. We agree with Bosma *et al*. (2018) that

institutional quality is not easy to define, because, for those authors, institutional quality is reflected in the institutional variables which support opportunity-oriented, productive entrepreneurship, to support economic growth. This means that the quality of institutions is perceived through the perspective of the well-functioning of institutions (Boudreaux & Nikolaev, 2019; Nair & Njolomole, 2020). However, in the present article, we define the quality of institutions as a feature of a well-functioning society (Thai & Turkina, 2014). Being aware of difficulties in defining a well-functioning society, we incorporate the Sustainable Development Goals (SDGs), proposed by the United Nations in the 2030 Agenda for Sustainable Development (United Nations, 2015) as the most accepted, worldwide, perspective of directions towards well-functioning societies. As the variety of institutional conditions as well as entrepreneurial outcomes are recognised (Audretsch *et al*., 2022), we develop the concept of various dimensions of institutional quality as our contribution to the field.

The undertaking of entrepreneurship by women is a multi-dimensional decision influenced by a diverse set of factors overlapping each other, which allows to propose a typology of factors. Women are influenced by both gender-neutral factors (Holmén *et al.*, 2011), that affect all entrepreneurs, regardless of their gender, and women-specific factors (Dutta & Mallick, 2018; Pérez-Pérez & Avilés-Hernández, 2016), that reflect women's specific situation. Factors influencing the decision to become an entrepreneur are categorised into individual factors, which are related to a person's personality and individual situation, and external factors, that are rooted in the social, economic, and institutional environment (Dileo & García Pereiro, 2019; Saunoris & Sajny, 2017; Wach & Głodowska, 2022). Predictors are also recognised as opportunity-driven factors, being a positive pull towards entrepreneurship, or as necessity-driven factors, which serve as a negative push towards entrepreneurship, often stemming from a lack of prospects in paid employment (Angulo-Guerrero *et al*., 2017; Nikolaev *et al.*, 2018).

In these typologies of factors, the quality of institutions is regarded as an external potential predictor of women's entrepreneurship, influencing the macroeconomic level. To contribute to the understanding of the varieties of institutions (Audretsch *et al*., 2022), we propose to consider four dimensions of the quality of institutions, assuming that they reflect a well-functioning society (Thai & Turkina, 2014). Our proposed dimensions related both to societal norms and values, as well as gender-neutral and gender-specific factors. We conceptualised the following dimensions of institutional quality which reflect diverse aspects of well-functioning societies, related to Sustainable Development Goals (United Nations, 2015) of the 2030 Agenda:

- the quality of positive governance (norm-based, and gender-neutral factors, related to the 16th (peace, justice and strong institutions) SGD),
- institutional quality of wealth distribution (value-based, and gender-neutral factors, related to the 1st (no poverty), 2nd (zero hunger), and 10th (reduced inequalities) SDGs),
- institutional quality of youth perspectives (value-based, and gender-neutral factors; related to the 4th (quality education) and 8th (decent work and economic growth) SDGs),
- institutional gender-based quality (value-based, and gender-specific factor, related to the 5th (gender equality) SDG).

Having conceptualised the various dimensions of the quality of institutions, we aimed to investigate their impact on women's entrepreneurship.

RESEARCH METHODOLOGY

To explore the impact of societal institutions on women's entrepreneurship, we conducted this research using aggregated data and official country statistics. We selected European countries with research years as members of the European Union (EU), because they represent relatively similar levels of institutional environment related to the EU membership and cultural background. We undertook the panel data analysis (PDA) based on the annual data from the European Statistical Office (EUROSTAT) and The World Bank databases for the years 2009 to 2021 for 27 countries, which means that we collected the panel data set with observations for 13 years multiplied by 27 countries. The data availability determined the choice of the research period. The panel data included the following coun-

tries based on their membership in the EU: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden. The panel data used in the research influence the choice of panel regression as an estimation method of modelling. We may find similar research attitudes in numerous research (*i.e.* Audretsch *et al*., 2022; Bosma *et al*., 2018; Martínez-Rodríguez *et al*., 2022).

Table 1. List of variables and their abbreviations

Variable	Abb.	Operationalisation	Source of data
Dependent variables			
Women's entrepreneurship	lnFE	'Women's entrepreneurship as a share of women in total number of entrepreneurs, aged 20-64 years'	Eurostat
Independent variables – quality of public governance			
Control of Corruption	lnCC	'Control of Corruption captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as 'capture' of the state by elites and private interests'	World Bank
Government Effectiveness	lnGE	'Government Effectiveness captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.'	World Bank
Political Stability and Absence of Violence	lnPV	'Political Stability and Absence of Violence/Terrorism measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism.'	World Bank
Regulatory Quality	lnRQ	'Regulatory Quality captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.'	World Bank
Rule of Law	lnLR	'Rule of Law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.'	World Bank
Voice and Accountability	lnVA	'Voice and Accountability captures perceptions of the extent to which a country's citizens can participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.'	World Bank
Independent variables – institutional quality of wealth distribution			
Gini coefficient	lnGINI	'Gini coefficient of equivalised disposable income as a measure of income concentration.'	Eurostat
People at risk of poverty	lnROP	'The share of persons with an equivalised disposable income below the risk-of-poverty threshold.'	Eurostat
Independent variables – the quality of youth perspectives			
Drop-out youth	lnDOY	'The share of the population aged 15 to 29 years who are not employed and not involved in education or training.'	Eurostat
Early leavers	lnEL	'The share of the population aged 18 to 24 years with, at most, lower secondary education who were not involved in any education or training during the four weeks preceding the survey.'	Eurostat
Independent variables – institutional gender-based quality			
Women on boards of directors	lnFBM	'Share of women as management board members'	Eurostat
Women in national parliaments	lnFNP	'Share of women among members of national parliaments'	Eurostat

Source: own study based on the methodology of Eurostat and World Bank.

The measure of women's entrepreneurship, as the dependent variable, reflects the proportion of women among the total number of self-employed individuals. We sourced these data from the open-access EUROSTAT database, which we generated from the EU Labour Force Survey (EU-LFS). The Eurostat webpage presents methodological details regarding the data (Eurostat, 2023).

The independent variables reflect several aspects of institutions: quality of public governance (measured by 'control of corruption;' 'government effectiveness;' 'political stability and absence of violence;' 'regulatory quality;' 'rule of law;' 'voice and accountability'), quality of wealth distribution ('Gini coefficient;' 'people at risk of poverty'), quality of youth perspectives ('drop-out youth,' 'early leavers') and institutional gender-based quality ('women in boards of directors,' 'women in national parliaments'). Details on definitions, abbreviations, and sources of data for all variables are presented in Table 1.

We converted all raw variables to natural logarithm to linearise the relationships among them, and to use the log-log model in further estimation. To mitigate the impact of collinearity among variables, which could lead to biased results, we calculated the variance inflation factors (VIFs) among the variables (Table 2). In the initial set of variables, the VIF value for the 'rule of law' variable (lnRL) exceeded the threshold of 10, commonly accepted in research in the body of literature (Markowska *et al.*, 2019; Dheer *et al*., 2019). Consequently, we excluded this variable from the estimations and recalculated the VIF values. The adjusted set of variables did not exhibit any collinearity (VIF values ranged up to 5.6, remaining below 10), thus making them suitable for inclusion in the panel regression estimation.

Table 2. VIFs collinearity tests of explanatory variables

Variables	VIFs an initial set of variables	VIFs in a corrected set of variables
lnCC	5.738	4.665
lnGE	7.228	5.380
lnPV	1.588	1.588
lnRQ	4.744	4.398
lnRL	11.613	X
lnVA	5.722	5.626
lnGINI	3.796	3.772
lnROP	3.790	3.736
lnEL	1.462	1.343
lnDOY	2.620	2.478
lnFBM	2.354	2.336
lnFNP	3.351	3.205

Source: own study.

Equation (1) specifies the general research model, with women's entrepreneurship rates as dependent variables, and factors representing the quality of institutions as independent variables, based on panel data:

$$lnFE_{it} = \beta_0 + \beta_1 lnCC_{it} + \beta_2 lnGE_{it} + \beta_3 lnPV_{it} + \beta_4 lnRQ_{it} + \beta_5 lnVA_{it} + \beta_6 lnGINI_{it} + \\ + \beta_7 lnROP_{it} + \beta_8 lnEL_{it} + \beta_9 lnDOY_{it} + \beta_{10} lnFBM_{it} + \beta_{11} lnFNB_{it} + \nu_{it} \quad (1)$$

in which:

$lnFE_{it}$ - indicator for the scale component of public innovation support index in the country reffered as *i*;

i - countries (1, 2, …, 27);

t - years (2009, 2010, …, 2021);

ν_{it} - total random error, consisting of a purely random part ε_{it} and individual effect u_i, which refers to the specific *i* unit of the panel ($\nu_{it} = \varepsilon_{it} + u_i$);

$\beta_0, \beta_1, \ldots \beta_{11}$ - vectors;

$lnCC_{it}, lnGE_{it}, lnPV_{it}, lnRQ_{it}, lnVA_{it}, lnGINI_{it}, lnROP_{it}, lnEL_{it}, lnDOY_{it}, lnFBM_{it}, lnFNP_{it}$, – independent variables in *t* period and in *i* country, converted into natural logarithms.

To determine the method of regression estimation, we performed both the Breusch-Pagan test and the Hausman test. The results of the Breusch-Pagan test ($\chi^2(1)=882.004$, p-value=8.01727e-194) point towards the use of the panel regression method, instead of the ordinary least squares (OLS)

method. The results of the Hausman test ($\chi^2(11)=13.020$, p-value=0.292) imply the estimation method employing the panel model with random effects.

RESULTS AND DISCUSSION

Following the results of the Breusch-Pagan test and the Hausman test, we employed the panel regression with random effects as the preferred estimation method (Table 3). We omitted two countries, *i.e.* Bulgaria and Romania, because of collinearity, meaning the final model estimation included 25 countries. The subsequent discussion of the findings relies on the statistical significance (p-value) as well as the values of the regression function parameters, which signify the influence of the independent variables on the dependent variables.

Table 3. Estimations of panel regression with random effects for women's entrepreneurship (lnFE) as dependent variable based on equation (1)

Variable	Coefficient β	Standard errors	p-value
constans	2.044	0.307	<0.0001***
Independent variables – quality of public governance			
lnCC	−0.034	0.009	<0.0001***
lnGE	−0.082	0.029	0.004***
lnPV	−0.017	0.010	0.087*
lnRQ	−0.033	0.029	0.256
lnVA	0.093	0.042	0.028**
Independent variables – institutional quality of wealth distribution			
lnGINI	0.345	0.104	0.001***
lnROP	0.001	0.057	0.987
Independent variables – the quality of youth perspectives			
lnEL	0.019	0.020	0.359
lnDOY	−0.095	0.027	0.0004***
Independent variables – institutional gender-based quality			
lnFBM	0.041	0.011	0.0001***
lnFNP	0.097	0.025	<0.0001***
Fit statistics of models	'Between' variance = 0.019 'Within' variance = 0.003 No of observations = 309 No of countries = 25 Wald $\chi^2(11)=167.664$ with p=0.000 Country effect – YES ($\chi^2(12) = 1354.24$ with p=0.000) Pesaran CD test: p = 0.6947		

Source: own study.

The panel regression model (Table 3), which estimates the impact of the quality of institutions on women's entrepreneurship, presents a diverse picture of interdependencies. Out of the 11 factors considered, 8 of them prove to be predictors of women's entrepreneurship. Based on p-values, we confirmed the statistical significance of the following independent variables: control of corruption (lnCC), government effectiveness (lnGE), political stability and absence of violence (lnPV), voice and accountability (lnVA), Gini coefficient (lnGINI), drop-out youth (lnDOY), women in boards of directors (lnFBM), and women in national parliaments (lnFNP). Meanwhile, three next factors were not statistically significant in explaining women's entrepreneurship, namely, regulatory quality (lnRQ), people at risk of poverty (lnROP), and early leavers (lnEL).

The results indicate that aspects of all four considered perspectives on the quality of institutions play a role in shaping women's entrepreneurship, at least to some extent. Variables presenting the

quality of public governance, quality of wealth distribution, quality of youth perspectives and quality based on gender are predictors of women's engagement in entrepreneurship, highlighting the importance of both norms and values, as well as gender-neutral and women-specific aspects of institutions.

The most intriguing aspect of the results relates to the direction of relationships between the quality of institutions and women's entrepreneurship. Despite the previous debate highlighting the necessity of improving institutional quality to enhance entrepreneurship (Williams & Bezeredi, 2018; Shahid *et al*., 2022), the situation is considerably more varied regarding women's participation in entrepreneurship. Women's entrepreneurship responds positively to certain aspects of institutions, namely, on voice and accountability (lnVA), drop-out youth (lnDOY), women on boards of directors (lnFBM), and women in national parliaments (lnFNP). These predictors can be treated as opportunity-driven motivators. Other factors, control of corruption (lnCC), government effectiveness (lnGE), political stability and absence of violence (lnPV), and Gini coefficient (lnGINI) impact women's entrepreneurship negatively, being necessity-driven motivators. These impacts are summarised in Table 4.

Table 4. Results of quality of institutions as motivators for women's entrepreneurship

Category	Necessity-driven motivators	Opportunity-driven motivators
Gender-neutral factors	lnCC, LnGE, lnPV, lnGINI	lnVA, lnDOY
Women-specific factors	–	lnFBM, lnFNP

Source: own study based on modelling results.

The absolute values of all function parameters suggest the strongest impact of income inequalities on women's entrepreneurship, as measured by the Gini coefficient. Regarding the absolute values, the next four predictors have an effect with similar strength (*i.e.* absolute values of β between 0.083 and 0.097), namely, the voice and accountability, drop-out youth, women in national parliament, and government effectiveness. The lowest absolute values of parameters are in the case of corruption control, political stability and absence of violence, and women on boards of directors.

Discussion

Investigating entrepreneurship through the lens of institutional theory leads to perceiving entrepreneurs as actors integrated within societal systems, and seeking appropriate connections with the broader society (Meyer & Rowan, 1977). In the present study, the focus is on the gendered aspects of entrepreneurship at the multinational level, by exploring how the quality of institutions impacts women's entrepreneurship. Four different dimensions of institutional quality are researched, encompassing both gender-neutral and women-specific factors.

Based on panel data for 27 European Union countries from 2009 to 2021, the overall picture suggests mixed effects of institutional quality on women's entrepreneurship, because various aspects of institutional quality serve as both positive and negative motivators.

The first considered aspect of an institution is the quality of governance. Three out of four statistically significant predictors of women's entrepreneurship, namely, control of corruption (lnCC), government effectiveness (lnGE), political stability and absence of violence (lnPV), affect women's entrepreneurship negatively, while the last predictor, voice and accountability (lnVA), affects women's entrepreneurship positively. The lower level of control of corruption, government effectiveness and political stability, as well as the higher level of citizens' voices and accountability impact the higher level of women's entrepreneurship.

These results contradict the general observation that the quality of governance reflects a well-structured society, thereby supporting a more favourable and predictable environment for entrepreneurship (Raza *et al*., 2019; Thai & Turkina, 2014). However, we may consider women's entrepreneurship as an occupational choice which is an alternative to paid employment. According to the theory of occupational choice, paid employment is characterised as a form of occupation with a risk-free salary compared to entrepreneurship, which is characterised as an occupation with uncertain or risky profits (Kihlstrom & Laffont, 1979; Pardo & Ruiz-Tagle, 2017). Individuals who are risk-takers are more likely

to become entrepreneurs, while those who are risk-averse tend to prefer paid employment over entrepreneurship (Bergner *et al.*, 2021; Block *et al.*, 2009). The quality of governance impacts the level of uncertainty in the market and the progress made in governance, as it creates a risk-free environment that tends to attract women more towards employment, rather than entrepreneurship. On the other hand, failures in achieving a high quality of governance serve as a necessity-driven motivation for women to engage in entrepreneurship.

The only difference among this group of measures was in the case of voice and accountability, as this aspect of quality of governance affected women's entrepreneurship as a positive motivator. As entrepreneurs are known for their characteristics of independent individuals (Bergner *et al.*, 2021; Markowska *et al.*, 2019; Wach & Głodowska, 2022), the higher level of freedom in impacting the government choice and expressing opinions encouraged women to engage in entrepreneurial activity as an opportunity-driven factor.

Another analysed aspect of the quality of institutions is related to the institutional quality of wealth distribution. In these groups of measures, the Gini coefficient was the predictor of women's entrepreneurship, whereby, the higher the level of income concentration the higher the level of women empowerment.

The interpretation of this result is somewhat controversial. On the one hand, financial motivators are well-known drivers for undertaking entrepreneurial activity (Wach & Głodowska, 2022), and the existence of a positive correlation between income inequality and entrepreneurship is proven (Atems & Shand, 2018). In this context, the higher level of the Gini coefficient indicates better possibilities to reach a higher concentration of income by women when becoming potential entrepreneurs. On the other hand, the value of well-structured societies is the reduction in inequalities, including the decrease in income concentration. In this context, reaching a lower level of income concentration as a goal of more equal societies discourages women from engaging in entrepreneurship. From the point of view of institutional qualities, this factor can be perceived as negative, because higher income inequalities motivate women entrepreneurs.

Among factors indicating the quality of youth perspectives, the measure of dropout youth impacts women's entrepreneurship negatively. The lower share of youth being out of education and out of employment affects the higher share of women's entrepreneurship. The level of dropout youth indicates the involvement of the young generation in society and reflects not only the quality of social structure, but also its future orientation. The societal value of the younger generation and future orientation creates the institutional environment supporting women to engage in entrepreneurial activity as a positive, opportunity-driven motivator.

The clearest picture was generated when we analysed women-specific aspects of institutions. Both measures of institutional gender-based quality, *i.e.* the share of women as members of management boards and the share of women as members of national parliament, were predictors of women's entrepreneurship affecting it positively. The higher share of women in managerial and political power positions affects the higher level of entrepreneurship among women. Gender equality as a value of well-structured societies creates the institutional environment acting positively as an opportunity-driven enabler upon women's decision to be entrepreneurs.

Summing up, the results of this research indicate the mixed effects of quality of institutions in shaping women's entrepreneurship, which is in line with the results of Dilli *et al.* (2018), showing the inexistence of ''perfect' institutional constellation,' and with the results of the work of Audretsch *et al.* (2022), advocating a nuanced understanding of institutional impact.

Theoretical and Practical Implications

The research results contribute to the theories of entrepreneurship, institutional theory, and gender studies. The results also confirm the multidimensional character of women's entrepreneurial motivators, in that gender-neutral (Holmén *et al*., 2011) and gender-specific factors (Dutta & Mallick, 2018; Pérez-Pérez & Avilés-Hernández, 2016), as well as positive and negative motivations (Angulo-Guerrero *et al.*, 2017; Nikolaev *et al.*, 2018) are not excluding each other, but rather they are overlapping.

Furthermore, we found confirmation for the explanatory power of institutional theory in women's entrepreneurship (Gimenez-Jimenez *et al*., 2020; Hägg *et al.*, 2023; Noguera *et al.*, 2015; Webb *et al.*, 2020; Wu & Li, 2019). However, our present study went beyond the most common explanation of national culture and gender-related stereotypes of entrepreneurship (Gimenez-Jimenez *et al.*, 2020; Jones *et al.*, 2019; Williams & Patterson, 2019). We confirmed the impact of institutions in the wider context of norms and values, and gender-neutral and women-specific aspects of the quality of institutions. All four analysed aspects of the influence of quality of institutions in well-functioning societies prove to be motivators for women's entrepreneurship: quality of public governance, quality of wealth distribution, quality of youth perspectives, and quality based on gender. It implies the need to incorporate not only the culture-based informal institutions into the debate on women's entrepreneurship, but also more diverse aspects.

The results also show that the discussion on the impact of institutions on women's entrepreneurship should be more multidimensional, not only in the context of different aspects of institutions, but also in the diversity of overlapping each other, and sometimes with the presence of conflicting factors. As entrepreneurship is an occupational choice alternative to paid employment, some aspects of institutional quality discourage women from entrepreneurship and encourage them to undertake safer paid employment. As necessity-driven motivators, just some of the institutional failures push women towards entrepreneurship. However, there are also aspects of quality of institutions, such as gender, political, and managerial empowerment, citizens' voices and accountability, and inclusion of younger generations, which act as opportunity-driven enablers, and focusing on them in the policy towards a well-structured society can reduce the gender gap in entrepreneurship.

Based on the results of this study, we may recommend the practical implications. In light of the mixed effects of the quality of institutions in shaping women's entrepreneurship, in the progress of the quality of governance, which is a goal of well-structured societies, it should be accepted that women might wish to choose paid employment instead of entrepreneurship. Only failures in achieving a high quality of governance, and in reducing income concentration, serve as necessity-driven motivations for women to engage in entrepreneurship.

However, to combine the goals of reaching well-structured societies and reducing the gender gap in entrepreneurship, policymakers and other stakeholders should focus on and promote opportunity-driven enablers of women's entrepreneurship. This can be achieved by fostering a sense of agency through freedom of expression, association, and access to media. Next, the societal value of the young generation and future orientation is another aspect of institutional quality which affects women's engagement in entrepreneurship as a positive and opportunity-driven motivator. Efforts should be made regarding the improvements of women's empowerment, both economic and political, both by raising women's participation in managerial and political positions, for example through the system of gender quotas, as well as through the higher social visibility of women.

Limitations and Further Investigations

This research has some limitations and potential avenues for further research, which mostly stem from the analysis level and the data used. Firstly, as we adopted a macroeconomic perspective, further investigations should delve into the individual level of women who run their own businesses. Secondly, we conducted the research among European Union states. This suggests the need to confirm the results regarding the impact of the quality of institutions on women's entrepreneurship in other countries, including both developed, transitional, and developing nations. This would provide new insights into the predictors of women's entrepreneurship. Thirdly, as this research relies on official statistics for entrepreneurship, it does not address the issue of entrepreneurship being formal or informal. However, since the institutional context impacts the informal economy, it is worth investigating whether the quality of institutions also affects women in their pursuit of entrepreneurship within the shadow economy or their transition from informal to formal entrepreneurship. Furthermore, while this research focuses primarily on women entrepreneurs, due to their unfavourable situation, it would also be worth investigating other socially disadvantaged groups. For example, ethnically different or elderly entrepreneurs could be examined, to understand the impact of the quality of institutions on these groups.

CONCLUSIONS

To conclude, this research confirms the significance of institutional quality in shaping women's entrepreneurship, as women are embedded in society, and they are influenced by external factors. The mixed effects of the quality of institutions on women's entrepreneurship are recognised, as institutions act both positively, as opportunity-driven forces, and negatively, as necessity-driven motivators. Some aspects of the quality of governance encourage women to choose the paid employment route as an occupational option, rather than the entrepreneurship route, because with good institutions women might feel safer in paid positions. Necessity-driven motivators, such as failures in quality of governance, can push women into entrepreneurship instead of paid employment.

However, there are some aspects of institutional quality which positively impact women's entrepreneurship. To combine the goals of reaching well-structured societies and reducing the gender gap in entrepreneurship, policy should focus on these three aspects. Gender political and managerial empowerment, citizens' voices and accountability, and inclusion of younger generations into society are the aspects of institutional quality which act as opportunity-driven enablers, and positively motivate women to engage in entrepreneurial activities.

The novelty of this study is the recognition of the mixed effects of various dimensions of institutional quality on women's entrepreneurship and its contribution to entrepreneurship theory, institutional theory, and gender studies.

REFERENCES

Acs, Z.J., Estrin, S., Mickiewicz, T., & Szerb, L. (2018). Entrepreneurship, institutional economics, and economic growth: An ecosystem perspective. *Small Business Economics*, *51*(2), 501-514. https://doi.org/10.1007/s11187-018-0013-9

Alsos, G.A., Ljunggren, E., Carter, S., & Jørstad, M.O. (2016). Women, Family and Entrepreneurship: Strategies for Managing Work-life Balance Challenges. *Academy of Management Proceedings*, *2016*(1), 16079. https://doi.org/10.5465/ambpp.2016.16079abstract

Anambane, G., & Adom, K. (2018). Assessing the role of culture in female entrepreneurship in contemporary subsaharan society: insights from the Nabadam district of Ghana. *Journal of Developmental Entrepreneurship*, *23*(03), 1850017. https://doi.org/10.1142/S1084946718500176

Angulo-Guerrero, M.J., Pérez-Moreno, S., & Abad-Guerrero, I.M. (2017). How economic freedom affects opportunity and necessity entrepreneurship in the OECD countries. *Journal of Business Research*, *73*, 30-37. https://doi.org/10.1016/j.jbusres.2016.11.017

Aparicio, S., Urbano, D., & Audretsch, D. (2016). Institutional factors, opportunity entrepreneurship and economic growth: Panel data evidence. *Technological Forecasting and Social Change*, *102*, 45-61. https://doi.org/10.1016/j.techfore.2015.04.006

Atems, B., & Shand, G. (2018). An empirical analysis of the relationship between entrepreneurship and income inequality. *Small Business Economics*, *51*(4), 905-922. https://doi.org/10.1007/s11187-017-9984-1

Audretsch, D.B., Belitski, M., Caiazza, R., & Desai, S. (2022). The role of institutions in latent and emergent entrepreneurship. *Technological Forecasting and Social Change*, *174*, 121263. https://doi.org/10.1016/j.techfore.2021.121263

Baumol, W.J. (1996). Entrepreneurship: Productive, unproductive, and destructive. *Journal of Business Venturing*, *11*(1), 3-22. https://doi.org/10.1016/0883-9026(94)00014-X

Bergner, S., Auburger, J., & Paleczek, D. (2021). The why and the how: A nexus on how opportunity, risk and personality affect entrepreneurial intention. *Journal of Small Business Management*, 1-34. https://doi.org/10.1080/00472778.2021.1934849

Block, J.H., Sandner, P.G., & Spiegel, F. (2009). How Do Risk Attitudes Differ Within The Group of Entrepreneurs? The Role of Motivation and Procedural Utility. *Journal of Small Business Management*, *53*(1), 183-206, Available at *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.1473989

Bosma, N., Content, J., Sanders, M., & Stam, E. (2018). Institutions, entrepreneurship, and economic growth in Europe. *Small Business Economics*, *51*(2), 483-499. https://doi.org/10.1007/s11187-018-0012-x

Boudreaux, C.J., & Nikolaev, B. (2019). Capital is not enough: Opportunity entrepreneurship and formal institutions. *Small Business Economics*, *53*(3), 709-738. https://doi.org/10.1007/s11187-018-0068-7

Bruton, G.D., Ahlstrom, D., & Li, H. (2010). Institutional Theory and Entrepreneurship: Where Are We Now and Where Do We Need to Move in the Future?. *Entrepreneurship Theory and Practice*, *34*(3), 421-440. https://doi.org/10.1111/j.1540-6520.2010.00390.x

Bui, H.T.M., Kuan, A., & Chu, T.T. (2018). Female entrepreneurship in patriarchal society: Motivation and challenges. *Journal of Small Business & Entrepreneurship*, *30*(4), 325-343. https://doi.org/10.1080/08276331.2018.1435841

Coleman, S., & Robb, A. (2009). A comparison of new firm financing by gender: Evidence from the Kauffman Firm Survey data. *Small Business Economics*, *33*(4), 397-411. https://doi.org/10.1007/s11187-009-9205-7

Damelang, A., & Ebensperger, S. (2020). Gender composition of occupations and occupational characteristics: Explaining their true relationship by using longitudinal data. *Social Science Research*, *86*, 102394. https://doi.org/10.1016/j.ssresearch.2019.102394

David, R.J., Tolbert, P.S., & Boghossian, J. (2019). Institutional Theory in Organization Studies. In R.J. David, P.S. Tolbert, & J. Boghossian (Eds.), *Oxford Research Encyclopedia of Business and Management*. Oxford University Press. https://doi.org/10.1093/acrefore/9780190224851.013.158

Delmar, F., & Davidsson, P. (2000). Where do they come from? Prevalence and characteristics of nascent entrepreneurs. *Entrepreneurship & Regional Development*, *12*(1), 1-23. https://doi.org/10.1080/089856200283063

Dheer, R.J.S., Li, M., & Treviño, L.J. (2019). An integrative approach to the gender gap in entrepreneurship across nations. *Journal of World Business*, *54*(6), 101004. https://doi.org/10.1016/j.jwb.2019.101004

Dileo, I., & García Pereiro, T. (2019). Assessing the impact of individual and context factors on the entrepreneurial process. A cross-country multilevel approach. *International Entrepreneurship and Management Journal*, *15*(4), 1393-1441. https://doi.org/10.1007/s11365-018-0528-1

Dilli, S., Elert, N., & Herrmann, A.M. (2018). Varieties of entrepreneurship: Exploring the institutional foundations of different entrepreneurship types through 'Varieties-of-Capitalism' arguments. *Small Business Economics*, *51*(2), 293-320. https://doi.org/10.1007/s11187-018-0002-z

Dorożyński, T., Dobrowolska, B., & Kuna-Marszałek, A. (2020). Institutional Quality in Central and East European Countries and Its Impact on FDI Inflow. *Entrepreneurial Business and Economics Review*, *8*(1), 91-110. https://doi.org/10.15678/EBER.2020.080105

Dutta, N., & Mallick, S. (2018). Enabling Women Entrepreneurs: Exploring Factors That Mitigate the Negative Impact of Fertility Rates on Female Entrepreneurship: Enabling Women Entrepreneurs: Exploring Factors That Mitigate the Negative Impact of Fertility Rates on Female Entrepreneurship. *Kyklos*, *71*(3), 402-432. https://doi.org/10.1111/kykl.12175

Esping-Andersen, G. (1998). *The three worlds of welfare capitalism* (Repr). Princeton Univ. Press.

Estrin, S., & Mickiewicz, T. (2011). Institutions and female entrepreneurship. *Small Business Economics*, *37*(4), 397-415. https://doi.org/10.1007/s11187-011-9373-0

Eurostat (2023). Eurostat Metadata. Retrieved from https://ec.europa.eu/eurostat/cache/metadata/en/lfsa_esms.htm on July 6, 2023.

Gaweł, A., & Mroczek-Dąbrowska, K. (2022). Gender pay gap in explaining female entrepreneurship – industry perspective of selected European countries. *International Journal of Manpower*, *43*(9), 42-59. https://doi.org/10.1108/IJM-12-2020-0554

Gaweł, A., & Toikko, T. (2023). Quality of Governance and Welfare Generosity as Institutional Predictors of Entrepreneurship: European Perspective. *SAGE Open*, *13*(4), https://doi.org/10.1177/21582440231205670

Gimenez-Jimenez, D., Calabrò, A., & Urbano, D. (2020). The neglected role of formal and informal institutions in women's entrepreneurship: A multi-level analysis. *Journal of International Entrepreneurship*, *18*(2), 196-226. https://doi.org/10.1007/s10843-020-00270-8

Hägg, G., Politis, D., & Alsos, G.A. (2023). Does gender balance in entrepreneurship education make a difference to prospective start-up behaviour?. *Education + Training*, *65*(4), 630-653. https://doi.org/10.1108/ET-06-2021-0204

Holmén, M., Min, T.T., & Saarelainen, E. (2011). Female entrepreneurship in Afghanistan. *Journal of Developmental Entrepreneurship*, *16*(03), 307-331. https://doi.org/10.1142/S1084946711001860

Jones, S., Martinez Dy, A., & Vershinina, N. (2019). 'We were fighting for our place': Resisting gender knowledge regimes through feminist knowledge network formation. *Gender, Work & Organization*, *26*(6), 789-804. https://doi.org/10.1111/gwao.12288

Kihlstrom, R.E., & Laffont, J.-J. (1979). A General Equilibrium Entrepreneurial Theory of Firm Formation Based on Risk Aversion. *Journal of Political Economy*, *87*(4), 719-748. https://doi.org/10.1086/260790

Madsen, S.R., & Scribner, R.T. (2017). A perspective on gender in management. *Cross Cultural & Strategic Management*, *24*(2), 231-250. https://doi.org/10.1108/CCSM-05-2016-0101

Markowska, M., Grichnik, D., Brinckmann, J., & Kapsa, D. (2019). Strategic orientations of nascent entrepreneurs: Antecedents of prediction and risk orientation. *Small Business Economics*, *53*(4), 859-878. https://doi.org/10.1007/s11187-018-0107-4

Martínez-Rodríguez, I., Quintana-Rojo, C., Gento, P., & Callejas-Albiñana, F.-E. (2022). Public policy recommendations for promoting female entrepreneurship in Europe. *International Entrepreneurship and Management Journal*, *18*(3), 1235-1262. https://doi.org/10.1007/s11365-021-00751-9

Meyer, J.W., & Rowan, B. (1977). Institutionalized Organizations: Formal Structure as Myth and Ceremony. *American Journal of Sociology*, *83*(2), 340-363. https://doi.org/10.1086/226550

Morazzoni, M., & Sy, A. (2022). Female entrepreneurship, financial frictions and capital misallocation in the US. *Journal of Monetary Economics*, *129*, 93-118. https://doi.org/10.1016/j.jmoneco.2022.03.007

Mustafa, M., & Treanor, L. (2022). Gender and Entrepreneurship in the New Era: New Perspectives on the Role of Gender and Entrepreneurial Activity. *Entrepreneurship Research Journal*, *12*(3), 213-226. https://doi.org/10.1515/erj-2022-0228

Naguib, R., & Jamali, D. (2015). Female entrepreneurship in the UAE: A multi-level integrative lens. *Gender in Management: An International Journal*, *30*(2), 135-161. https://doi.org/10.1108/GM-12-2013-0142

Nair, M., & Njolomole, M. (2020). Microfinance, entrepreneurship and institutional quality. *Journal of Entrepreneurship and Public Policy*, *9*(1), 137-148. https://doi.org/10.1108/JEPP-07-2019-0061

Nikolaev, B.N., Boudreaux, C.J., & Palich, L. (2018). Cross-Country Determinants of Early-Stage Necessity and Opportunity-Motivated Entrepreneurship: Accounting for Model Uncertainty. *Journal of Small Business Management*, *56*, 243-280. https://doi.org/10.1111/jsbm.12400

Noguera, M., Alvarez, C., Merigó, J.M., & Urbano, D. (2015). Determinants of female entrepreneurship in Spain: An institutional approach. *Computational and Mathematical Organization Theory*, *21*(4), 341-355. https://doi.org/10.1007/s10588-015-9186-9

Ojong, N., Simba, A., & Dana, L.-P. (2021). Female entrepreneurship in Africa: A review, trends, and future research directions. *Journal of Business Research*, *132*, 233-248. https://doi.org/10.1016/j.jbusres.2021.04.032

Omri, A. (2020). Formal versus informal entrepreneurship in emerging economies: The roles of governance and the financial sector. *Journal of Business Research*, *108*, 277-290. https://doi.org/10.1016/j.jbusres.2019.11.027

Pardo, C., & Ruiz-Tagle, J. (2017). The dynamic role of specific experience in the selection of self-employment versus wage-employment. *Oxford Economic Papers*, *69*(1), 189-212. https://doi.org/10.1093/oep/gpw047

Parsons, T. (1956). Suggestions for a Sociological Approach to the Theory of Organizations. *Administrative Science Quarterly*, *1*(1), 63. https://doi.org/10.2307/2390840

Pérez-Pérez, C., & Avilés-Hernández, M. (2016). Explanatory factors of female entrepreneurship and limiting elements. *Suma de Negocios*, *7*(15), 25-31. https://doi.org/10.1016/j.sumneg.2015.12.004

Pistilli, L., Paccagnini, A., Breschi, S., & Malerba, F. (2022). Gender Bias in Entrepreneurship: What is the Role of the Founders' Entrepreneurial Background?. *Journal of Business Ethics*. https://doi.org/10.1007/s10551-022-05275-y

Prabhu, R., Kamath, V., D'Souza, D. J. and Joshi, H. (2023), *An Assessment of M-Commerce Adoption Amongst Women Fish Vendors In Coastal India Using System Dynamics Approach, AGRIS on-line Papers in Economics and Informatics*, *15*(20), 83-91. https://10.7160/aol.2023.150207.

Raza, A., Muffatto, M., & Saeed, S. (2019). The influence of formal institutions on the relationship between entrepreneurial readiness and entrepreneurial behaviour: A cross-country analysis. *Journal of Small Business and Enterprise Development*, *26*(1), 133-157. https://doi.org/10.1108/JSBED-01-2018-0014

Reichborn-Kjennerud, K., & Svare, H. (2014). Entrepreneurial growth strategies: The female touch. *International Journal of Gender and Entrepreneurship*, *6*(2), 181-199. https://doi.org/10.1108/IJGE-04-2013-0043

Saunoris, J.W., & Sajny, A. (2017). Entrepreneurship and economic freedom: Cross-country evidence from formal and informal sectors. *Entrepreneurship & Regional Development*, *29*(3-4), 292-316. https://doi.org/10.1080/08985626.2016.1267806

Schwartz, S.H. (2012). An Overview of the Schwartz Theory of Basic Values. *Online Readings in Psychology and Culture*, *2*(1). https://doi.org/10.9707/2307-0919.1116

Scott, W.R. (1995). *Institutions and organizations*, Thousand Oaks: Sage.

Scruggs, L.A., & Ramalho Tafoya, G. (2022). Fifty years of welfare state generosity. *Social Policy & Administration*, *56*(5), 791-807. https://doi.org/10.1111/spol.12804

Shahid, M.S., Rodgers, P., Vershinina, N., Zehra, M.E., & Williams, C.C. (2022). Advancing the institutional perspective on informal entrepreneurship: A study of formalization intentions among street entrepreneurs. *International Journal of Entrepreneurial Behavior & Research*, *28*(8), 2103-2131. https://doi.org/10.1108/IJEBR-02-2022-0151

Shchegolev, I., & Hayat, A. (2018). Institutional Quality, Governance and Economic Growth: Evidence from Former Soviet Countries, *Journal of Advances in Economics and Finance 3*(4), 120-127, https://doi.org/10.22606/jaef.2018.34002

Stiglitz, J.E. (2000). Formal and informal institutions. In Partha Dasgupta & Ismail Serageldin (Eds.) *Social capital: A multifaceted perspective* (pp. 59-68). Washington, World Bank.

Stuchlý, P., Hennyeyová, K., Janšto, E., Šilerová, E. and Vaněk, J. (2023). *Marketing Management of Electronic Commerce in the Process of Current Marketing Management*, *AGRIS on-line Papers in Economics and Informatics*, *15*(2), 105-113, https://doi.org/10.7160/aol.2023.150209

Su, Y., Wu, N., & Zhou, X. (2019). An entrepreneurial process model from an institutional perspective: A multiple case study based on the grounded theory. *Nankai Business Review International*, *10*(2), 277-305. https://doi.org/10.1108/NBRI-08-2017-0046

Temple, J. (1999). The new growth evidence. *Journal of Economic Literature 37*(1), 112-156, https://doi.org/10.1257/jel.37.1.112

Thai, M.T.T., & Turkina, E. (2014). Macro-level determinants of formal entrepreneurship versus informal entrepreneurship. *Journal of Business Venturing*, *29*(4), 490-510. https://doi.org/10.1016/j.jbusvent.2013.07.005

Ughetto, E., Rossi, M., Audretsch, D., & Lehmann, E.E. (2020). Female entrepreneurship in the digital era. *Small Business Economics*, *55*(2), 305-312. https://doi.org/10.1007/s11187-019-00298-8

United Nations (2015). Transforming Our World: The 2030 Agenda For Sustainable Development. Retrieved from https://sdgs.un.org/2030agenda on November 20, 2023.

Van Ewijk, A.R., & Belghiti-Mahut, S. (2019). Context, gender and entrepreneurial intentions: How entrepreneurship education changes the equation. *International Journal of Gender and Entrepreneurship*, *11*(1), 75-98. https://doi.org/10.1108/IJGE-05-2018-0054

Wach, K., & Głodowska, A. (2022). Entrepreneurship research in economics and management: Understanding the term and research trends. *International Entrepreneurship Review*, *8*(4), 7-24. https://doi.org/10.15678/IER.2022.0804.01

Webb, J.W., Khoury, T.A., & Hitt, M.A. (2020). The Influence of Formal and Informal Institutional Voids on Entrepreneurship. *Entrepreneurship Theory and Practice*, *44*(3), 504-526. https://doi.org/10.1177/1042258719830310

Williams, C.C., & Bezeredi, S. (2018). An institutional theory of informal entrepreneurship: some lessons from Fyr Macedonia. *Journal of Developmental Entrepreneurship*, *23*(03), 1850019. https://doi.org/10.1142/S108494671850019X

Williams, C.C., & Shahid, M.S. (2016). Informal entrepreneurship and institutional theory: Explaining the varying degrees of (in)formalization of entrepreneurs in Pakistan. *Entrepreneurship & Regional Development*, *28*(1-2), 1-25. https://doi.org/10.1080/08985626.2014.963889

Williams, J., & Patterson, N. (2019). New directions for entrepreneurship through a gender and disability lens. *International Journal of Entrepreneurial Behavior & Research*, *25*(8), 1706-1726. https://doi.org/10.1108/IJEBR-12-2017-0499

Wu, J., & Li, Y. (2019). An Exploratory Cross-Country Analysis of Female Entrepreneurial Activity: The Roles of Gendered Institutions. *Entrepreneurship Research Journal*, *0*(0). https://doi.org/10.1515/erj-2018-0019

Xie, Z., Wang, X., Xie, L., Dun, S. & Li, J. (2021). Institutional context and female entrepreneurship: A country-based comparison using fsQCA. *Journal of Business Research*, 132(August), 470-480, https://doi.org/10.1016/j.jbusres.2021.04.045

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Acknowledgements and Financial Disclosure

The authors would like to thank the anonymous referees for their useful comments, which allowed to increase the value of this article.

Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Published by Krakow University of Economics – Krakow, Poland

Ministry of Education and Science
Republic of Poland

The journal is co-financed in the years 2022-2024 by the Ministry of Education and Science of the Republic of Poland in the framework of the ministerial programme "Development of Scientific Journals" (RCN) on the basis of contract no. RCN/SP/0583/2021/1 concluded on 13 October 2022 and being in force until 13 October 2024.

EBER
Entrepreneurial Business and Economics Review
2024, Vol. 12, No. 2
10.15678/EBER.2024.120208

ChatGPT adoption and digital entrepreneurial intentions: An empirical research based on the theory of planned behaviour

Cong Doanh Duong

ABSTRACT

Objective: The objective of the article is to adopt the theory of planned behaviour to explore how ChatGPT adoption in entrepreneurship can inspire individuals' intentions to become digital entrepreneurs underlying the nuanced mediation mechanism of psychological and cognitive constructs (attitude towards digital entrepreneurship, subjective norms, and perceived behavioural control).

Research Design & Methods: Drawing on the sample of 604 higher education students at six universities in Vietnam, I used Cronbach's alpha and confirmatory factor analysis to test the construct's consistent reliability and validity. Then, I used multiple regression to test hypotheses.

Findings: Results of the current research reported that ChatGPT adoption in entrepreneurship significantly and positively affects individuals' attitudes towards digital entrepreneurship, subjective norms, perceived behavioural control, and digital entrepreneurial intentions. Interestingly, three core antecedents in the theory of planned behaviour significantly mediate the impacts of ChatGPT adoption in entrepreneurship on digital entrepreneurial intentions.

Implications & Recommendations: The practical takeaways include enhancing education with tech-positive modules, personalized guidance for digital entrepreneurs, hands-on skill development through workshops, and AI-friendly policies for business integration.

Contribution & Value Added: The current research is the first study which provides empirical evidence indicating the impacts of ChatGPT adoption in entrepreneurship on individuals' attitudes towards digital entrepreneurship, subjective norms, and perceived behavioural control, which, in turn, inspire their digital entrepreneurial intentions. Thus, these findings contribute to the extent of entrepreneurship literature, especially in the landscape of the AI revolution.

Article type:	research article
Keywords:	ChatGPT adoption in entrepreneurship; Theory of Planned Behaviour; digital entrepreneurial intentions; attitudes towards digital entrepreneurship; subjective norms; perceived behavioural control
JEL codes:	L26, M13

Received: 8 December 2023 Revised: 19 February 2024 Accepted: 10 April 2024

Suggested citation:
Duong, C.D. (2024). ChatGPT adoption and digital entrepreneurial intentions: An empirical research based on the theory of planned behaviour. *Entrepreneurial Business and Economics Review,* 12(2), 129-142. https://doi.org/10.15678/EBER.2024.120208

INTRODUCTION

Business venturing offers solutions to economic challenges and opens the doors for unemployed youths (Nguyen, 2023; Wach *et al*., 2023), especially in the digital economy (Davidsson & Sufyan, 2023). The Internet has revolutionized international commercialization, enabling businesses to function on a global level (Mir *et al*., 2022). Digital entrepreneurship often leads to business creation that empowers entrepreneurs to create, promote, negotiate, deliver, and sell their products and services within the Internet economy (Abaddi, 2023). The advent of the Internet has transformed the landscape of company ecosystems by shifting marketplaces online, attracting both novice and experienced en-

trepreneurs to engage in the realm of digital commerce (Davidsson & Sufyan, 2023). Consequently, exploring how technology-related factors affect youths' digital entrepreneurial intentions is vital to inspiring entrepreneurial activities in the digital economy.

Today, artificial intelligence (AI) is transforming the entrepreneurial terrain, bringing about a revolution in how businesses are initiated, expanded, and managed (Vecchiarini & Somià, 2023). This transformation is underpinned by a diverse array of digital technologies within the scope of AI, crafted to adeptly process information and assist humans across various tasks (Short & Short, 2023). In contrast to conventional computers, AI systems exhibit the capability to learn and adjust dynamically, consistently advancing without requiring manual interventions from humans (Gupta *et al*., 2023).

Recent advancements in AI, such as automation, data analysis, and natural language processing (NLP), have streamlined operations for companies spanning various industries (Vecchiarini & Somià, 2023). In addition to contributing to the process of established enterprises, AI plays a crucial role in supporting the establishment of new ventures (Davidsson & Sufyan, 2023). It can affect how individuals intend to create a business venture, foster their recognition of the business opportunity, and redefine the processes by which innovative business ideas are identified and capitalized upon (Shepherd & Majchrzak, 2022). Moreover, AI functions as a valuable asset for entrepreneurs, assisting in strategic decision-making, bolstering sales functions, enhancing performance outcomes, and reducing costs for start-ups by implementing AI-powered bots to manage accounts and operations (Korzynski *et al*., 2023). In other words, the emergence of generative pretrained transformer (GPT) technology not only signifies the process and implementation of advanced AI systems (Abaddi, 2023) but also introduces novel opportunities and challenges for entrepreneurship research and education (Wach *et al*., 2023).

Despite increasing interest and research focused on AI adoptions, such as ChatGPT, and entrepreneurship (Davidsson & Sufyan, 2023; Short & Short, 2023), no empirical studies, according to our best knowledge, examine how individuals' ChatGPT adoption in entrepreneurship (CGA) can foster their digital entrepreneurial intentions (DEI), especially underlying a cognitive reasoned mechanism, which can be explained by three core components (attitude towards digital entrepreneurship-ATD, subjective norms-SN, and perceived behavioural control-PBC) in the theory of planned behaviour (TPB) (Al-Mamary & Alraja, 2022; Ashraf *et al*., 2021). Consequently, I adopted the TPB to address the following research questions (RQs):

RQ1: Are the TPB suited to explore individuals' digital entrepreneurial intentions in the context of the AI (and GPTs) revolution?

RQ2: Does individuals' ChatGPT adoption in entrepreneurship significantly increase their subjective norms, attitude towards digital entrepreneurship, perceived behavioural control, and intentions to create a digital firm?

RQ3: Do three components in the TPB (subjective norms, attitude towards digital entrepreneurship, perceived behavioural control) significantly mediate the relationship between individuals' ChatGPT adoption in entrepreneurship and their digital entrepreneurial intentions?

The remainder of the article consists of four sections, *i.e.* literature review, materials and methodology, results and discussion, and conclusions and avenues for further research.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Digital Entrepreneurship and Theory of Planned Behaviour

Recognized as a fundamental driver of economic growth, job generation, and innovative inspiration, entrepreneurship involves both establishing a new venture and the evolution of existing ones (Hussen, 2023; Wach *et al*., 2022). Digital venturing creation represents a contemporary manifestation of entrepreneurial activity, stemming from opportunities generated by digitization and digitalization (Aloulou *et al*., 2023), which introduce transformative disruptions to businesses and industries (Abaddi, 2023). These transformative shifts occur at the convergence point of digital technologies and entrepreneurial initiatives (Mir *et al*., 2022). Digital entrepreneurship is defined as the pursuit of new business opportunities facilitated by emerging media and internet technology (Mir *et al*., 2022). While traditional and digital

entrepreneurship shares fundamental principles such as opportunity identification, idea generation, and product and/or service commercialization, the key distinction lies in the utilization of digital technologies across the various value chain activities of the business venturing (Abaddi, 2023).

Recently, digital business venturing has been a subject of growing interest in the field of entrepreneurship, garnering global attention and significantly affecting entrepreneurial research (Al-Mamary & Alraja, 2022; Xin & Ma, 2023). Its significance in the realm of entrepreneurship has been firmly established in recent years, both in terms of research and academic exploration (Aloulou *et al*., 2023). Indeed, academic focus on digital business ventures has intensified, which is evident in the rising number of recent studies (Kraus *et al*., 2023; Xin & Ma, 2023). The body of digital entrepreneurship literature is becoming more organized, and the field is obtaining credibility and a distinct identity, overcoming challenges of research disintegration and multiplicity (Aloulou *et al*., 2023). Digital business venturing, which emerges from the utilization of new media, the internet, information and communication technologies (ICT), and digital emerging technologies (Aloulou *et al*., 2023), can be classified into three categories, including mild, moderate, and extreme, based on the degree of integration of technology tools into venture-related activities. In mild digital entrepreneurship, a website complements the physical existence of the venture. The moderate category entails the digitization of the marketing function, and in the extreme form, the website functions as just one of several digital interfaces, where the product itself is digital (Mir *et al*., 2022).

Given that entrepreneurial intentions play a pivotal role in comprehending the entrepreneurial process and subsequent entrepreneurial behaviour (Al-Mamary & Alraja, 2022; Ashraf *et al*., 2021), it is crucial to delve into how these intentions take place in the digital context (Xin & Ma, 2023). Entrepreneurial intentions fundamentally represent individuals' plans to establish new business ventures in the future (Tran *et al*., 2023). When this deliberate objective is applied to pursuing an entrepreneurial career facilitated by information and communication technology, DEI can be defined as the individual's intention to launch a new business by leveraging digital technologies, which includes, but is not limited to the Internet, World Wide Web, mobile technologies, Web 2.0, and other related technologies nature (Mir *et al*., 2022). Although various theoretical frameworks, such as the theory of bounded rational planned behaviour (Ashraf *et al*., 2021), technology acceptance model (Abaddi, 2023), and the capital theory (Mir *et al*., 2022), have been applied to explore the antecedents of technology-driven entrepreneurial intentions, Aloulou *et al*. (2023) argue that the TPB, developed by Ajzen (1991), has proven to be robust in predicting and elucidating different social behaviours through recent decades. Moreover, the TPB was applied to explore the entrepreneurial phenomenon in a body of prior studies (Abaddi, 2023; Al-Mamary & Alraja, 2022; Aloulou *et al*., 2023) indicating that this model is appropriate to explain how CGA inspire individuals' intent to become digital entrepreneurs.

According to the TPB, intention, and subsequently behaviour, are sculpted by three core components, *i.e.* attitude, subjective norms, and perceived behavioural control. While attitude represents the extent to which someone judges the impact of the desired behaviour (becoming a digital entrepreneur, for example) favourably or unfavourably, subjective norms involve the pressure exerted by referent others (social groups), such as family, friends, relatives, regarding whether the specific behaviour is likely to be performed or not. Perceived behavioural control serves not only as a predictor of intentions but also actual behaviour (Ajzen, 1991). The impacts of TPB antecedents differ across studies. Indeed, earlier research indicates that ATD and PBC play significant roles in explaining DEI (Al-Mamary & Alraja, 2022; Aloulou *et al*., 2023). However, the impacts of SN on DEI remain a point of contention in entrepreneurial research, with some studies confirming its significance (Al-Mamary & Alraja, 2022; Ashraf *et al*., 2021) and others not supporting this impact (Aloulou *et al*., 2023). Consequently, in this study, we assumed that there are significant relationships between the three components in the TPB and higher education students' intentions, as well as between these components with each other in the context of Vietnam.

H1: Intended decisions are positively correlated with (a) ATD, (b) SN, and (c) PBC.

H2: Attitudes are positively correlated with (a) SN and (b) PBC.

H3: Self-confidence is positively correlated with SN.

ChatGPT Adoption in Entrepreneurship

The introduction of GPTs marks a noteworthy accomplishment in the realms of large language models (LLMs). These models can generate diverse types of information, encompassing texts, codes, audio, figures, and videos, contingent upon the data on which they were trained (Korzynski *et al*., 2023). Recent progress in the field has given rise to conversational agents like ChatGPT, Bard (Google), Chatsonic, and Amazon Code-whisperer (Short & Short, 2023). In the context of business venturing, prior studies indicated an extensive report delineating the criteria for entrepreneurs to harness ChatGPT in the formation of their business plans (Abaddi, 2023). It also emphasized the practical application of ChatGPT by providing tailored prompts designed to aid entrepreneurs in developing various sections of their business plans, encompassing aspects like marketing and financial plans (Davidsson & Sufyan, 2023). Research also elucidated the merits and demerits of using ChatGPT compared to traditional business planning methods (Vecchiarini & Somià, 2023). Recently, Short and Short (2023) explored the role of generative language models, such as ChatGPT, in the entrepreneurial discourse. They demonstrated the models' ability to replicate CEO archetypes, underscoring the importance of skilful prompt engineering.

The assimilation of ChatGPT within entrepreneurial practices is intricately linked to individuals' attitudes towards digital entrepreneurship. This attitude serves as a lens through which individuals evaluate the value and efficacy of ChatGPT adoption in the entrepreneurial landscape (CGA) (Short & Short, 2023). Entrepreneurs harbouring a favourable attitude towards digital entrepreneurship are more inclined to perceive ChatGPT as an invaluable tool capable of enhancing productivity and fostering innovation (Duong *et al*., 2023). This positive outlook is rooted in the alignment of ChatGPT with the foundational principles of digital entrepreneurship, where technology is harnessed for business growth and operational efficiency. Individuals, including higher education students, viewing ChatGPT as a strategic means to gain a competitive edge within the dynamic digital landscape are naturally predisposed to its adoption, considering it an integral component of their positive attitude towards digital entrepreneurship. Moreover, the emergence of a shared perception with the entrepreneurial community (peers, friends, family business, colleges) that GPT is instrumental for business development can foster a positive perception of approval from surrounding people (SN), whereas higher education students who firmly believe in the possession of their requisite skills and resources to seamlessly integrate ChatGPT into their entrepreneurial pursuits are thereby predisposed to a positive entrepreneurial self-efficacy.

Finally, the positive correlation between ChatGPT adoption and digital entrepreneurial intentions underscores a reciprocal relationship between individuals' intentions and the integration of advanced technologies, such as ChatGPT. Moreover, DEI encapsulates individuals' strategic plans to initiate a new business through the adept use of digital technologies (Elnadi & Gheith, 2023). Individuals with pronounced ChatGPT adoption are more likely to perceive digital business venture creation as a proactive pathway towards realizing their digital business goals (Abaddi, 2023). They can also perceive the adoption of ChatGPT as a strategic and forward-thinking move to actualize their digital business aspirations and thus foster their intentions to become a digital entrepreneur.

H4: ChatGPT adoption in the entrepreneurial landscape is positively correlated with (a) SN, (b) PBC, (c) ATD, and (d) DEI.

Mediation Effects

Being aligned with the TPB framework, prior studies affirmed that three core components of TPB (ATD, SN, and PBC) were found to mediate the impacts of different factors, such as digital entrepreneurial knowledge (Aloulou *et al*., 2023), GPT revolution (Abaddi, 2023), soft and hard skills (Garcez *et al*., 2023), on DEI. It is therefore assumed that ATD, SN, and PBC serve as the mediators, which receive the impacts of CGA, which, in turn, inspire higher education students' intentions to engage in digital entrepreneurial activities. Firstly, the AI technology adoption (*i.e.* ChatGPT) is predicted to enhance PBC since positive experiences and increased proficiency with the technology contribute to individuals'

feeling more in control of their tasks. In turn, this heightened control, indirectly affects digital entrepreneurial intention while surrounding people with the entrepreneurial community (SN) are also expected to be affected positively as individuals adopt ChatGPT, creating a supportive environment and, consequently, shaping DEI (Abaddi, 2023). Moreover, the positive experiences and perceived value of ChatGPT when using it can also cultivate individuals' attitudes towards digital business ventures, subsequently affecting higher education students' strategic plans for digital ventures. Indeed, some psychological and social theories argue that the adoption of emerging technology affects not only personal perceptions of control, perceived approvals from surrounding people, and favourable beliefs about certain behaviours but also indirectly arouses individuals' behavioural intentions through these perceptions. The following hypotheses are thus supported.

H5: ChatGPT adoption in the entrepreneurial landscape has indirect effects on DEI through (a) ATD, (b) SN, and (c) PBC.

Figure 1 demonstrates the hypothesized model.

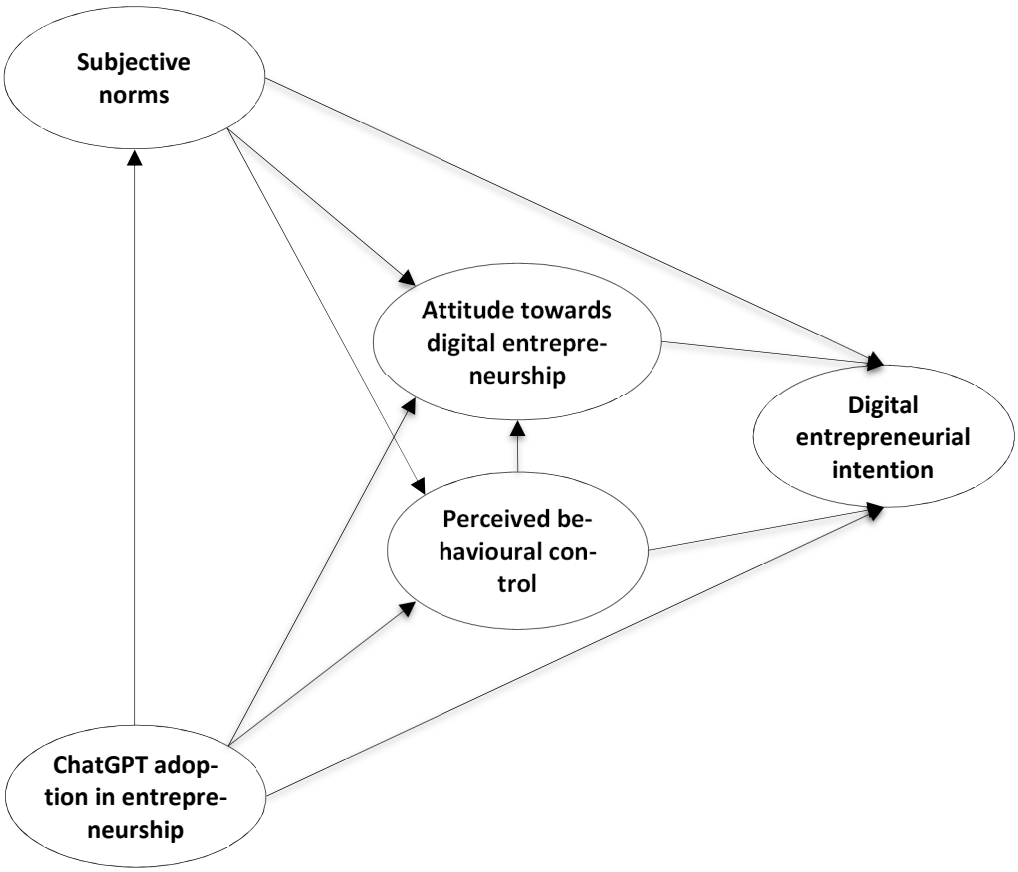

Figure 1. Hypothesized model
Source: own elaboration.

RESEARCH METHODOLOGY

Sampling and Data Collection

The current study included 604 higher education students selected through stratified random sampling across six universities in Vietnam, employing a four-stage procedure between 10 August and 10 September 2023. In the initial stage, the selection focused on two primary regions in Vietnam, *i.e.* the Northern and Southern areas with the demarcation line located in Quang Tri province. A thorough evaluation of the educational terrain revealed that Vietnam boasts 224 higher education institutions, with 123 universities in the Northern region and 101 in the Southern region. Collectively, these universities serve an

estimated two million students (Tran *et al*., 2023). During the second phase, I used a strategic randomization method to choose three universities in each region. I based the selection on the impact rank, utilizing the ranking web of Vietnam universities as a criterion (Webometrics, 2023). In the third stage, I sampled two to four classes from each university based on their fields of study. In the last sampling stage, I enlisted research participants through questionnaires directly delivered to higher education students with the support of lecturers and assistants. Participants explicitly noted that their involvement in the survey was voluntary. They assumed that their responses would be handled with confidentiality and security and the gathered data would be solely utilized for academic purposes.

The majority of higher education students aged from 20 to 21 (43.0%), followed by the 18-19 age group (32.6%), 22-23 (20.0%), and only 4.3% of them aged over 23 years old. Furthermore, 47.7% of students were women and 56.6% of them enrolled in the field of economics and business management. In total, 51.2% of higher education students reported that they have business experience, whereas only 44.7% of them used to participate in entrepreneurship-related courses.

Scales

I developed the scales and their items by referencing existing literature, with minor adjustments made to align with the context and objectives of the research. I conducted a pilot study involving 30 higher education students from the target population to evaluate the appropriateness and effectiveness of the adopted scales and their items. I utilized a seven-point Likert scale to assess the items, providing a rating continuum from 1 (strongly disagree) to 7 (strongly agree). I adopted and slightly modified five items from the research of Zaremohzzabieh *et al*. (2016) and Abdelfattah *et al*. (2022) to measure CGA. I adapted SN (two items) and ATD (five items) from Taylor and Todd's research. I also adopted and slightly adjusted PBC from the study of Ashraf *et al*. (2021). Finally, the scale measured for DEI (three items) was adopted from the research of Xin and Ma (2023). The final items of the scales were summarized in Table 1.

RESULTS AND DISCUSSION

Scale Assessment

I used SPSS 28.0 and AMOS 25.0 to conduct all analyses in our study. First, Cronbach's alpha (α was utilized to test the consistent reliability of scales. Results reported that Cronbach's alpha if item deleted of ATD5 'I believe that digital entrepreneurship has a special feature that requires low investment' was 0.937 > 0.905 (α of ATD construct). Moreover, ATD5 was thus eliminated from further analyses (Christmann & Van Aelst, 2006). Then, I conducted confirmatory factor analysis (CFA) to examine the scales' validity. The excellent indices of model fitness have been presented in the measurement model (see Figure 2): χ^2 = 400.319, df = 97, GFI = 0.921, AGFI = 0.876, CFI = 0.969, TLI = 0.957, NFI = 0.960, and RMSEA = 0.072. Moreover, Table 1 revealed that the standardized regression weights of all items were above 0.5, α of all constructs was higher than the cut-off value of 0.63, and CR of all constructs were higher than the threshold value of 0.7. The AVE of CGA reached only 0.497, however, according to Hair *et al*. (2020), when its CR was higher than 0.7 (CR of CGA = 0.830), it can be satisfied for further analyses. Consequently, all constructs demonstrated their reliability and validity. I used Harman's single-factor test to examine common method bias (CMB), indicating that a mere 45.548 of the overall variance, failing below the 50% threshold, could be accounted for by a single factor (Duong *et al*., 2023). This result demonstrates the absence of significant CMB in the study.

Hypothesis Testing and Discussion

Multiple linear regression with age, gender, and major as control variables was then employed to test hypotheses. Table 2 and Table 3 present the results of multiple linear regression. Results revealed that DEI is positively affected by SN (β = 0.093, p < 0.5), PBC (β = 0.500, p < 0.001), and ATD (β = 0.442, p < 0.001). Thus, H1a, H1b, and H1c were supported. Moreover, ATD was positively associated with SN (β = 0.108, p < 0.05) and PBC (β = 0.552, p < 0.001) while SN positively affected PBC (β = 0.689, p < 0.001). Therefore, H2a, H2b, and H3 were supported. Thus, our study corroborated the existing literature within the TPB model, especially on the impacts of ATD and PBC on DEI (Al-Mamary & Alraja, 2022;

Ashraf *et al*., 2021). The positive correlations between ATD, PBC, and DEI resonate with the broader literature, highlighting the importance of attitude and self-confidence in affecting entrepreneurial decision-making (Aloulou *et al*., 2023). It also means that higher education with a constructive attitude and self-efficacy are more likely to exhibit a proactive stance in leveraging innovative solutions to achieve their entrepreneurial goals (Abaddi, 2023). These findings also align with previous studies that adopted the TPB to explore individuals' DEI (Al-Mamary & Alraja, 2022; Aloulou *et al*., 2023; Ashraf *et al*., 2021). However, unlike some prior studies (Aloulou *et al*., 2023; Truong *et al*., 2022), our study found that SN inspires higher education students' ATD, PBC, and intention to become digital entrepreneurs. It reflects that higher education students are not isolated actors; instead, their attitudes (ATD), self-confidence (PBC), and intended decisions (DEI) are intricately linked to the perceptions and expectations of those around them (Al-Mamary & Alraja, 2022).

Table 1. Scale items and convergent validity analysis

Constructs	Codes	Measures	M	S.D.	λ	α	CR	AVE
ChatGPT adoption in entrepreneurship	CGA1	I use ChatGPT to obtain information on the benefits realized in the area of digital entrepreneurship.	5.041	1.259	0.615	0.820	0.830	0.497
	CGA2	I use ChatGPT to obtain information about the problems and obstacles that will be encountered in the area of digital entrepreneurship.	4.475	1.260	0.626			
	CGA3	I obtain information about entrepreneurial opportunities offered by government agencies/individuals through ChatGPT adoption.	4.843	1.016	0.802			
	CGA4	I use ChatGPT to obtain information on loan deals for digital entrepreneurship.	3.084	1.352	0.745			
	CGA5	I can increase lots of knowledge about digital entrepreneurship through ChatGPT adoption.	4.581	0.784	0.720			
Attitude towards digital entrepreneurship	ATD1	I would like to start up a digital firm.	4.101	1.560	0.868	0.937	0.941	0.803
	ATD2	Starting up a digital firm is a good idea.	4.725	1.445	0.981			
	ATD3	Starting up a digital firm would be pleasant for me.	4.768	1.433	0.975			
	ATD4	Starting up a digital firm is a wise idea.	4.296	1.090	0.738			
Subjective norms	SN1	People who influence my behaviour would think that I should start a digital firm.	3.010	0.912	0.796	0.851	0.864	0.762
	SN2	People who are important to me would think that I should start a digital firm.	2.980	1.077	0.944			
Perceived behavioural control	PBC1	I am capable of starting and operating a digital firm.	3.151	1.459	0.950	0.909	0.916	0.787
	PBC2	Starting up and operating a digital firm is entirely within my control.	2.742	1.227	0.934			
	PBC3	I have the financial ability to start and operate a digital firm.	3.220	1.133	0.765			
Digital entrepreneurial intentions	DEI1	If I have the opportunity or make decisions freely, I will choose to be a digital entrepreneur.	4.238	1.787	0.750	0.866	0.900	0.751
	DEI2	Considering various restrictions (such as lack of money), I will still choose digital entrepreneurship.	2.834	1.246	0.855			
	DEI3	I am likely to be a digital entrepreneur in the next five years.	3.118	1.362	0.980			

Notes: N= 604; M: Mean; S.D.: Standard deviation; λ: Standardized regression weights; α: Cronbach's alpha; CR: Composite reliability; AVE: Average variance extracted.
Source: own study.

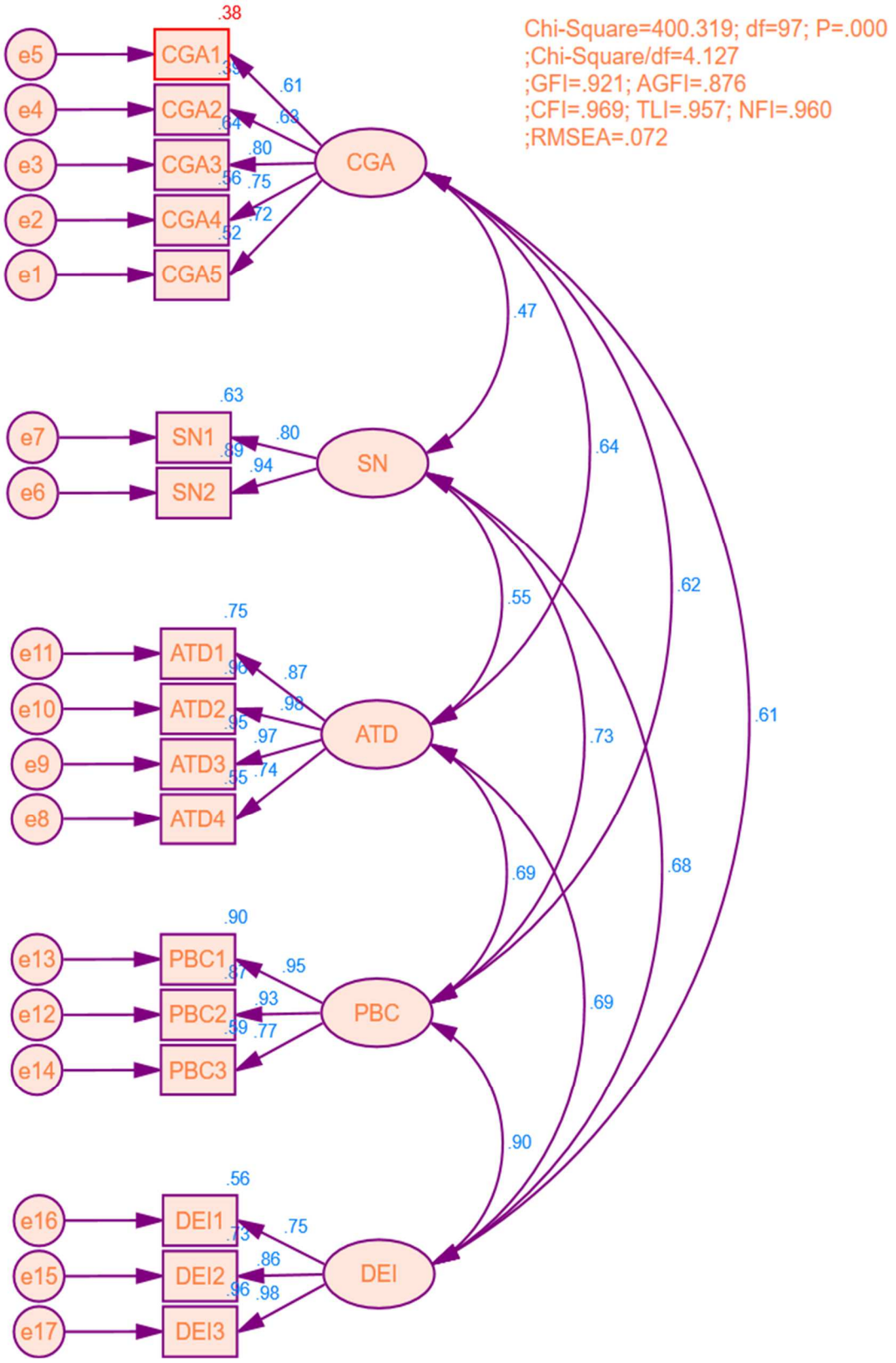

Figure 2. Measurement model
Source: own elaboration.

Table 2. Linear regression models (DVs: Subjective norms and Perceived behavioural control)

Variables	Subjective norms				Perceived behavioural control			
	Model 1				Model 2			
	β	SE	t	p-value	β	SE	t	p-value
Constant	1.343***	0.251	5.346	< 0.001	-0.642**	0.240	-2.679	0.008
Gender	-0.017	0.071	-0.246	0.806	-0.076	0.066	-1.157	0.248
Age	0.015	0.043	0.356	0.722	0.028	0.040	0.717	0.474
Major	-0.050	0.072	-0.705	0.481	-0.116	0.067	-1.735	0.083
ChatGPT adoption	0.391***	0.040	9.654	< 0.001	0.418***	0.041	10.318	< 0.001
Subjective norms	–				0.689***	0.038	18.090	< 0.001
R^2	0.140				0.534			
Adjusted R^2	0.134				0.530			
F Change	24.394***				136.963***			

Notes: N= 604. *p < 0.05. **p < 0.01, ***p < 0.001. DVs: Dependent variables.
Source: own study.

Table 3. Linear regression models (DVs: Attitude towards digital entrepreneurship and digital entrepreneurial intention)

Variables	Attitude towards digital entrepreneurship				Digital entrepreneurial intention			
	Model 3				Model 4			
	β	SE	t	p-value	β	SE	t	p-value
Constant	0.968***	0.213	4.547	< 0.001	-0.906***	0.191	-4.748	< 0.001
Gender	0.040	0.058	0.688	0.492	-0.041	0.051	-0.795	0.427
Age	0.061	0.035	1.729	0.084	0.040	0.031	1.305	0.192
Major	-0.088	0.059	-1.488	0.137	-0.004	0.052	-0.077	0.939
ChatGPT adoption	0.291***	0.039	7.493	< 0.001	0.135***	0.036	3.755	< 0.001
Subjective norms	0.108*	0.042	2.582	0.010	0.093*	0.037	2.498	0.013
Perceived behavioural control	0.552***	0.036	15.271	< 0.001	0.500***	0.038	13.333	< 0.001
Attitude towards digital entrepreneurship	–				0.442***	0.036	12.251	< 0.001
R^2	0.614				0.775			
Adjusted R^2	0.610				0.772			
F Change	157.023***				293.445***			

Notes: N= 604. *p < 0.05. **p < 0.01, ***p < 0.001. DVs: Dependent variables.
Source: own study.

Noticeably, CGA positively influenced SN (β = 0.391, p < 0.001), PBC (β = 0.418, p < 0.001), ATD (β = 0.291, p < 0.001), and DEI (β = 0.135, p < 0.001). Thus, H4a, H4b, and H4c were supported. Although the role of AI tools, such as ChatGPT, in therepreneurship activities has been highlighted in the body of prior studies (Abaddi, 2023; Davidsson & Sufyan, 2023; Short & Short, 2023), no studies explore the impacts of CGA on DEI as well as the components (ATD, SN, and PBC) in the TPB. Therefore, this finding provides some valuable insight into the dynamics of technology adoption within the digital entrepreneurial context. First, individuals who adopt ChatGPT in their ventures are more likely to perceive a positive environment and encouragement from their network. It can also resonate with the idea that witnessing peers and mentors embracing emerging technologies, such as ChatGPT, creates a supportive atmosphere, contributing to a shared perception of its value within the entrepreneurial community (Elnadi & Gheith, 2023). Second, the positive relation between CGA and PBC emphasizes that hands-on experience with ChatGPT, coupled with supportive resources and training, enhances individuals' confidence in incorporating digital entrepreneurial activities. Finally, the positive impact of CGA on ATD and DEI suggests that experiencing the benefits of ChatGPT for entrepreneurship, such as building plans for productivity, searching the market information, etc., can not only contribute to an individuals' favourable evaluation of digital entrepreneurship as whole, but also harbour their intentions to involve

in digital entrepreneurial activities. Abaddi (2023) states that the ChatGPT model developed by Open AI has gained significant prominence, revolutionizing various industries and reaching one million users within five days. The obstacles and prospective avenues for future research in AI competencies are crucial for aiding companies and entrepreneurs in cultivating and utilizing these competencies. This facilitates business venture creation and competitive businesses. Based on the lights from the TPB, our study is the first to show how ChatGPT adoption in the entrepreneurial landscape can foster individuals' ATD, SN, PBC, and intentions to become digital entrepreneurs.

Table 4. Mediation analyses

Mediation regression coefficients	Effects	Bias	P-value	Bootstrap 95% CIs	
				LLCI	ULCI
CGA → SN → ATD → DEI	0.015**	-0.000	0.002	0.006	0.025
CGA → SN → ATD	0.041**	-0.000	0.001	0.017	0.067
CGA → SN → PBC	0.210***	0.000	0.000	0.170	0.254
CGA → PBC → ATD → DEI	0.060***	-0.000	0.000	0.043	0.079
SN → ATD → DEI	0.037**	-0.000	0.002	0.015	0.063
CGA → SN → PBC → DEI	0.104***	0.000	0.000	0.081	0.130
CGA → ATD → DEI	0.103***	0.000	0.000	0.076	0.131
SN → PBC → DEI	0.264***	-0.000	0.000	0.222	0.310
PBC → ATD → DEI	0.179***	-0.001	0.000	0.140	0.224
CGA → SN → DEI	0.026*	0.000	0.018	0.005	0.049
CGA → SN → PBC → ATD → DEI	0.038***	-0.000	0.000	0.027	0.052
SN → PBC → ATD → DEI	0.096***	-0.001	0.000	0.073	0.124
SN → PBC → ATD → DEI	0.268***	-0.001	0.000	0.227	0.317
CGA → PBC → ATD	0.167***	0.000	0.000	0.125	0.210
CGA → PBC → DEI	0.165***	0.001	0.000	0.122	0.210
CGA → SN → PBC → ATD	0.106***	0.000	0.000	0.082	0.133

Notes: N= 604. *p < 0.05. **p < 0.01, ***p < 0.001. DVs: CGA = ChatGPT adoption in entrepreneurship; SN = Subjective norms; PBC = Perceived behavioural control; ATD = Attitude towards digital entrepreneurship; DEI = Digital entrepreneurial intention.
Source: own study.

Mediation analyses in Table 4 revealed that SN (β = 0.026, p < 0.05, 95% CI [0.005, 0.049]), PBC (β = 0.165, p < 0.001, 95% CI [0.122, 0.210]), and ATD (β = 0.103, p < 0.001, 95% CI [0.076, 0.131]) significantly mediated the relation between CGA and DEI. The data also supported H5a, H5b, and H5c. This finding was in line with some prior studies which affirmed that ATD, SN, and PBC served as significant mediators in the transformation of the impacts of various precursors on DEI (Abaddi, 2023; Aloulou *et al*., 2023; Garcez *et al*., 2023). Nevertheless, my study is the first research providing empirical evidence of how ATD, SN, and PBC significantly mediate the impacts of CGA on DEI. The inclusion of these mediating variables strengthens the explanatory power of the TPB in the context of technology adoption and entrepreneurial decision-making. Finally, although not performing related hypotheses, I also found that CGA had a serial impact on DEI through the CGA-SN-PBC-ATD-DEI path (β = 0.038, p < 0.001, 95% CI [0.027, 0.052). The identification of a serial mediation pathway (CGA-SN-PBC-ATD-DEI) unveils the impact of ChatGPT adoption in the digital entrepreneurial landscape. This sequential influence suggests that the psychological mechanisms triggered by ChatGPT adoption unfold in a specific order, starting with perceived approval from surrounding people (SN), moving through perceived self-efficacy (PBC), and evaluation of digital entrepreneurial endeavours (ATD), and culminating in intentions to become digital entrepreneurs.

CONCLUSIONS

Theoretical Contributions

The current study makes some notable theoretical contributions to digital entrepreneurial literature amidst the AI (and ChatGPT) revolution. Firstly, this is the first study to provide empirical evidence af-

firming the sufficient and appropriate application of the TPB in examining individuals' digital entrepreneurial intentions within the transformative landscape of AI (and ChatGPT). The theoretical framework of TPB, encompassing SN, ATD, and PBC, proves effective in elucidating the complex psychological processes guiding entrepreneurial decision-making in the era of advanced AI technologies. Secondly, with the rapid adoption of ChatGPT, surpassing the adoption rates of well-established platforms, like Instagram, Spotify, Dropbox, Facebook, and Netflix, as highlighted in earlier research (Korzynski *et al*., 2023), underscoring the uniqueness and significance of ChatGPT in the technological landscape, our study establishes a significant relationship between individuals' ChatGPT adoption in entrepreneurship and key psychological constructs (SN, ATD, and PBC) and their intentions to become digital entrepreneurs. These findings contribute to a nuanced understanding of how the adoption of specific AI technologies, such as ChatGPT, affects individuals' cognitive and attitudinal aspects, sculpting their inclination towards digital business venturing establishments. Thirdly, our study provides empirical evidence of a novel mediation and serial mediation pathway, illustrating that the impacts of ChatGPT adoption unfold sequentially through SN, PBC, and ATD before affecting DEI. This sequential influence adds depth to the theoretical understanding of the intricate cognitive processes involved in technology adoption within entrepreneurial contexts. Finally, building on prior research highlighting ChatGPT's rapid adoption surpassing established platforms, the current research empirically supports and extends this observation. The distinctive adoption pattern of ChatGPT underscores its unique and significant role in the technological landscape, providing empirical grounding for the theoretical contributions in the extant literature.

Practical Implications

The practical implications derived from this research can offer some valuable insight into various stakeholders, such as educators, institutions, policymakers, and administrators. Firstly, educational institutions can use the insights from this research to enhance digital entrepreneurial programs. The findings highlight the significance of SN, ATD, and PBC in shaping higher education students' DEI. Curriculum designers can integrate modules that foster a positive attitude towards technology, provide training on digital skills, and emphasize the social impacts of AI adoption. This equips students with a holistic understanding of the psychological factors contributing to successful digital entrepreneurship. Secondly, universities and colleges can offer targeted guidance and counselling services to students interested in digital entrepreneurship. Recognizing the positive impact of ChatGPT adoption on DEI, counselling sessions can focus on building a supportive social network, fostering a positive attitude towards AI adoption in business ventures, and enhancing students' confidence in using AI tools in entrepreneurship. These sessions can address the psychological aspects highlighted in the study, providing personalized support for aspiring digital (potential) entrepreneurs. Thirdly, practical implications extend to skill development initiatives tailored for higher education students. Institutions may offer workshops and training programs to develop the digital skills necessary for successful entrepreneurial endeavours. Emphasizing PBC, these initiatives can provide hands-on experiences with AI technologies, like ChatGPT, ensuring students feel confident and capable of interacting with such tools for their entrepreneurial future venture.

Moreover, higher education institutions may offer AI resources, funding opportunities, and collaborative spaces where students can experiment with AI technologies. Such support reinforces perceived behavioural control and empowers students to translate their intentions into concrete entrepreneurial actions. Finally, policymakers can benefit from these findings to formulate policies that encourage the integration of AI technologies, such as ChatGPT, within entrepreneurial ecosystems. Understanding the psychological factors influencing digital entrepreneurial intentions can guide policymakers in creating an environment that supports and incentivizes the adoption of AI tools, especially in the digital entrepreneurial landscape. This may include initiatives to promote digital literacy, provide resources for technology training, and facilitate collaborative networks that positively shape subjective norms.

Limitations and Avenues for Further Research

Although the research provided valuable insights, certain limitations should be acknowledged. Firstly, the generalizability of the findings may be constrained by the specific cultural and educational context of the research sample, which primarily consisted of higher education students in

two regions of Vietnam. Replicating the study in diverse cultural settings would enhance the external validity of the results. Furthermore, the cross-sectional design employed in this research provides a static snapshot, and future studies could adopt longitudinal approaches to track the dynamic evolution of attitudes, subjective norms, and perceived behavioural control over time. Secondly, reliance on self-report measures introduces the possibility of common methods and social desirability biases. Integrating objective measures or employing multi-source data collection methods could enhance the robustness of future research. Despite efforts to control for relevant variables, potential confounding variables might influence the observed relationships. Future studies could consider a more comprehensive set of control variables to isolate the effects of interest.

Furthermore, qualitative approaches such as interviews or focus groups could complement quantitative research, offering richer insights into the nuanced factors influencing students' perceptions and intentions regarding ChatGPT adoption in entrepreneurship. Expanding participant demographics beyond higher education students to include professionals, entrepreneurs, and individuals from diverse age groups would contribute to a more comprehensive understanding of the broader implications of ChatGPT adoption on digital entrepreneurial intentions. Lastly, further research should explore the underlying mechanisms through which subjective norms, attitudes, and perceived behavioural control mediate the relationship between ChatGPT adoption and digital entrepreneurial intentions. Exploring the psychological processes and contextual factors shaping these mediating effects would deepen our understanding of the complex interplay between AI adoption and entrepreneurial psychology. Addressing these limitations and pursuing these avenues for further study will contribute to the ongoing scholarly discourse on the intersection of AI adoption, entrepreneurial intentions, and digital business strategies.

REFERENCES

Abaddi, S. (2023). GPT revolution and digital entrepreneurial intentions. *Journal of Entrepreneurship in Emerging Economies*, *Vol. ahead-of-print*, 1-28. https://doi.org/10.1108/jeee-07-2023-0260

Abdelfattah, F., Al Halbusi, H., & Al-Brwani, R.M. (2022). Influence of self-perceived creativity and social media use in predicting E-entrepreneurial intention. *International Journal of Innovation Studies*, *6*(3), 119-127. https://doi.org/10.1016/j.ijis.2022.04.003

Ajzen, I. (1991). The Theory of Planned Behavior. *Journal of Behavior and Human Decision Process*, *50*, 197-211. https://doi.org/https://doi.org/10.1016/0749-5978(91)90020-T

Al-Mamary, Y.H.S., & Alraja, M.M. (2022). Understanding entrepreneurship intention and behavior in the light of TPB model from the digital entrepreneurship perspective. *International Journal of Information Management Data Insights*, *2*(2), 1-8. https://doi.org/10.1016/j.jjimei.2022.100106

Aloulou, W., Ayadi, F., Ramadani, V., & Dana, L.-P. (2023). Dreaming digital or chasing new real pathways? Unveiling the determinants shaping Saudi youth's digital entrepreneurial intention. *International Journal of Entrepreneurial Behavior & Research*, *Vol. ahead-of-print*, 1-26. https://doi.org/10.1108/ijebr-10-2022-0942

Ashraf, M.A., Alam, M.M.D., & Alexa, L. (2021). Making decision with an alternative mind-set: Predicting entrepreneurial intention toward f-commerce in a cross-country context. *Journal of Retailing and Consumer Services*, *60*, 1-15. https://doi.org/10.1016/j.jretconser.2021.102475

Christmann, A., & Van Aelst, S. (2006). Robust estimation of Cronbach's alpha. *Journal of Multivariate Analysis*, *97*(7), 1660-1674. https://doi.org/10.1016/j.jmva.2005.05.012

Davidsson, P., & Sufyan, M. (2023). What does AI think of AI as an external enabler (EE) of entrepreneurship? An assessment through and of the EE framework. *Journal of Business Venturing Insights*, *20*, 1-12. https://doi.org/10.1016/j.jbvi.2023.e00413

Duong, C.D., Vu, T.N., & Ngo, T.V.N. (2023). Applying a modified technology acceptance model to explain higher education students' usage of ChatGPT: A serial multiple mediation model with knowledge sharing as a moderator. *The International Journal of Management Education*, *21*(3), 1-18. https://doi.org/10.1016/j.ijme.2023.100883

Elnadi, M., & Gheith, M.H. (2023). The role of individual characteristics in shaping digital entrepreneurial intention among university students: Evidence from Saudi Arabia. *Thinking Skills and Creativity*, *47*, 1-22. https://doi.org/10.1016/j.tsc.2023.101236

Garcez, A., Franco, M., & Silva, R. (2023). The influence of the pillars of digital academic entrepreneurship on university students' entrepreneurial intention. *European Journal of Innovation Management*, *Vol. ahead-of-print*, 1-25. https://doi.org/10.1108/ejim-01-2023-0051

Gupta, B.B., Gaurav, A., Panigrahi, P.K., & Arya, V. (2023). Analysis of artificial intelligence-based technologies and approaches on sustainable entrepreneurship. *Technological Forecasting and Social Change*, *186*, 1-9. https://doi.org/10.1016/j.techfore.2022.122152

Hair, J.F., Howard, M.C., & Nitzl, C. (2020). Assessing measurement model quality in PLS-SEM using confirmatory composite analysis. *Journal of Business Research*, *109*, 101-110. https://doi.org/10.1016/j.jbusres.2019.11.069

Hussen, M.S. (2023). Institutional quality and economic growth in Sub-Saharan Africa: a panel data approach. *Journal of Economics and Development*, *25*(4), 332-348. https://doi.org/10.1108/jed-11-2022-0231

Korzynski, P., Mazurek, G., Altmann, A., Ejdys, J., Kazlauskaite, R., Paliszkiewicz, J., Wach, K., & Ziemba, E. (2023). Generative artificial intelligence as a new context for management theories: analysis of ChatGPT. *Central European Management Journal*, *13*(1), 3-13. https://doi.org/10.1108/cemj-02-2023-0091

Kraus, S., Vonmetz, K., Bullini Orlandi, L., Zardini, A., & Rossignoli, C. (2023). Digital entrepreneurship: The role of entrepreneurial orientation and digitalization for disruptive innovation. *Technological Forecasting and Social Change*, *193*, 1-12. https://doi.org/10.1016/j.techfore.2023.122638

Mir, A.A., Hassan, S., & Khan, S.J. (2022). Understanding digital entrepreneurial intentions: A capital theory perspective. *International Journal of Emerging Markets*, *18*(12), 6165-6191. https://doi.org/10.1108/ijoem-05-2021-0687

Nguyen, N.M. (2023). The effect of FDI on domestic entrepreneurship: the case of greenfield investment and cross-border M&A activities. *Journal of Economics and Development*, *25*(1), 62-78. https://doi.org/10.1108/jed-11-2022-0228

Shepherd, D.A., & Majchrzak, A. (2022). Machines augmenting entrepreneurs: Opportunities (and threats) at the Nexus of artificial intelligence and entrepreneurship. *Journal of Business Venturing*, *37*(4), 1-19. https://doi.org/10.1016/j.jbusvent.2022.106227

Short, C.E., & Short, J.C. (2023). The artificially intelligent entrepreneur: ChatGPT, prompt engineering, and entrepreneurial rhetoric creation. *Journal of Business Venturing Insights*, *19*, 1-10. https://doi.org/10.1016/j.jbvi.2023.e00388

Taylor, S., & Todd, P.A. Understanding Information Technology Usage: A Test of Competing Models. *Information Systems Research*, *6*(2), 144-176. Retrieved from http://www.jstor.org/stable/23011007 on July 1, 2023.

Tran, V.H., Vu, T.N., Pham, H.T., Nguyen, T.P.T., & Duong, C.D. (2023). Closing the entrepreneurial attitude-intention-behavior gap: the direct and moderating role of entrepreneurship education. *Journal of International Education in Business*, *0*(0), 1-26. https://doi.org/10.1108/jieb-05-2023-0026

Truong, H.T., Le, T.P., Pham, H.T.T., Do, D.A., & Pham, T.T. (2022). A mixed approach to understanding sustainable entrepreneurial intention. *The International Journal of Management Education*, *20*(3), 1-14. https://doi.org/10.1016/j.ijme.2022.100731

Vecchiarini, M., & Somià, T. (2023). Redefining entrepreneurship education in the age of artificial intelligence: An explorative analysis. *The International Journal of Management Education*, *21*(3), 1-11. https://doi.org/10.1016/j.ijme.2023.100879

Wach, K., Duong, C.D., Ejdys, J., Kazlauskaitė, R., Korzynski, P., Mazurek, G., Paliszkiewicz, J., & Ziemba, E. (2023). The dark side of generative artificial intelligence: A critical analysis of controversies and risks of ChatGPT. *Entrepreneurial Business and Economics Review*, *11*(2), 7-24. https://doi.org/10.15678/EBER.2023.110201

Wach, K., Maciejewski, M., & Głodowska, A. (2022). U-Shaped Relationship in International Entrepreneurship: Entrepreneurial Orientation and Innovation as Drivers of Internationalisation of Firms. *Technological and Economic Development of Economy*, *28*(4), 1044-1067. https://doi.org/10.3846/tede.2022.16690

Wach, K., Maciejewski, M., & Głodowska, A. (2023). Inside entrepreneurial orientation: Do risk-taking and innovativeness influence proactiveness?. *Economics and Sociology*, *16*(1). https://doi.org/10.14254/2071-789X.2023/16-1/11

Webometrics. (2023). *Ranking Web of Vietnam Universities*. https://www.webometrics.info/en/asia/vietnam

Xin, B., & Ma, X. (2023). Gamifying Online Entrepreneurship Education and Digital Entrepreneurial Intentions: An Empirical Study. *Entertainment Computing*, *46*, 1-11. https://doi.org/10.1016/j.entcom.2023.100552

Zaremohzzabieh, Z., Samah, B.A., Muhammad, M., Omar, S.Z., Bolong, J., Hassan, S.B.H., & Mohamed Shaffril, H.A. (2016). Information and Communications Technology Acceptance by Youth Entrepreneurs in Rural Malaysian Communities: The Mediating Effects of Attitude and Entrepreneurial Intention. *Information Technology for Development*, *22*(4), 606-629. https://doi.org/10.1080/02681102.2015.1128384

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Acknowledgements and Financial Disclosure

This research is funded by National Economics University, Hanoi, Vietnam.

Conflict of Interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Published by Krakow University of Economics – Krakow, Poland

Ministry of Education and Science
Republic of Poland

The journal is co-financed in the years 2022-2024 by the Ministry of Education and Science of the Republic of Poland in the framework of the ministerial programme "Development of Scientific Journals" (RCN) on the basis of contract no. RCN/SP/0583/2021/1 concluded on 13 October 2022 and being in force until 13 October 2024.

Entrepreneurial Business and Economics Review

2024, Vol. 12, No. 2

10.15678/EBER.2024.120209

The determinants of entrepreneurship in urban and non-urban regions: A fuzzy-set QCA approach

Evelyn Calispa-Aguilar

ABSTRACT

Objective: The objective of the article is to identify and analyse the configurations of regional entrepreneurial ecosystems that lead to high levels of entrepreneurship in urban and non-urban regions.

Research Design & Methods: This study employed This study employed necessary condition analysis (NCA) and a fuzzy-set qualitative comparative analysis (fs/QCA) to reveal how different combinations of six elements of entrepreneurial ecosystems (EE): culture, supports, human capital, policy, markets, and finance, support the presence of high levels of entrepreneurship across 42 urban and non-urban regions in Colombia and Ecuador.

Findings: The NCA results revealed that no single element was necessary for the presence of high levels of regional business density. Conversely, some ecosystem elements become necessary when the expected ecosystem outcome is high levels of regional share of high-growth firms. Sufficiency analysis revealed several distinct combinations of elements that lead to high entrepreneurship levels in both urban and non-urban regions.

Implications & Recommendations: The findings of this study are valuable for researchers interested in understanding the complexity of EEs and for policymakers. This study provides empirical evidence of the differentiated relevance of EEs' elements depending on the urban-rural context. Moreover, results suggest that a one-size-fits-all approach for entrepreneurship policymaking might be inadequate since the requirements for achieving high levels of entrepreneurial development are substantially different between urban and non-urban regions.

Contribution & Value Added: This study contributes to the ongoing discussion on entrepreneurial ecosystems complexity, particularly regarding the questions of how ecosystem elements interact to support entrepreneurship in a particular place and whether all ecosystem elements are equally important for entrepreneurship.

Article type: research article

Keywords: entrepreneurial ecosystems; rural entrepreneurship; QCA; non-urban; South America

JEL codes: L26, M13

Received: 5 September 2023 Revised: 9 January 2024 Accepted: 11 January 2024

Suggested citation:

Calispa-Aguilar, E. (2024). The Determinants of entrepreneurship in urban and non-urban regions: A fuzzy-set QCA approach. *Entrepreneurial Business and Economics Review,* 12(2), 143-156. https://doi.org/10.15678/EBER.2024.120209

INTRODUCTION

Entrepreneurship is widely acknowledged as an important driver of economic growth. Extensive literature confirms the positive impact of entrepreneurship on the economic performance of nations, regions, and cities (Ács *et al*., 2008; Audretsch *et al*., 2015; Naudé, 2013). The core of entrepreneurship research is the concept of entrepreneurial ecosystems (EE) and its key role in enabling entrepreneurship (Malecki, 2018; Wurth *et al*., 2022). Entrepreneurship is a complex and multidimensional phenomenon, whose success depends on the interaction of a set of interconnected factors and actors within a place, *i.e.* an ecosystem. The concept of EE has emerged as one of the most comprehensive frameworks for understanding and measuring entrepreneurship (Autio *et al*., 2018). It has provided valuable insights to scholars and policymakers, facilitating a comprehensive understanding of how entrepreneurship is generated and sustained in specific locations. As a result, the

concept has gained considerable attention in both policy and research, leading to a substantial increase in publications over the past decade. However, there are still gaps in the conceptualisation of EE that require attention (Cavallo *et al*., 2019; Stam, 2015).

One important criticism of research on EEs is that studies have focused almost exclusively on ecosystems in large, urbanised regions, and well-developed metropolitan areas, primarily located in developed economies (Aldrich & Ruef, 2018; Audretsch, 2021; Roundy, 2017) leading to a limited understanding of EEs in non-urban regions in developing economies (Cao & Shi, 2021; Freire-Gibb & Gregson, 2019; Guerrero *et al*., 2021; Muñoz *et al.*, 2022; Villegas-Mateos, 2021). Moreover, EEs are highly localised and operate within specific localities or regions, and draw upon local resources, institutions, and networks (Malecki, 2018; Welter, 2011). In this context, exploring the effect of the urban-rural divide on EE has attracted increasing attention from researchers (Calispa-Aguilar, 2021; Miles & Morrison, 2020; Muñoz & Kimmitt, 2019). Despite the socioeconomic disparities between urban and non-urban settings, non-urban areas have increasingly demonstrated the capacity to foster diverse forms of entrepreneurial activities. The availability of natural resources, human capital, and localised knowledge can effectively give rise to rural entrepreneurship (Müller & Korsgaard, 2018). However, the distinct socioeconomic and geographic characteristics may give rise to different ways for entrepreneurship development in non-urban areas which can be substantially different to the ways how entrepreneurship occurs in urban settings (Sternberg, 2022).

Moreover, debates exist regarding the understanding of EE complexity (Brown & Mason, 2017; Haarhaus *et al*., 2020; Roundy *et al*., 2018). It is now well-established that the interaction of EE elements predominantly determines the ecosystem's success (Ács *et al*., 2014; Stam, 2015). However, the academic discussion of EEs seems to remain focused on identifying the essential 'ingredients' of an ecosystem and overlooks the importance of understanding the 'recipes' or paths for their combination into a sustainable ecosystem (Malecki, 2018). In this regard, scholars argue for further empirical investigations into the complex causal relationships among EE elements using methods such as network analysis, agent-based modelling, interpretivist approaches, or qualitative comparative analysis (Berger & Kuckertz, 2016; Douglas *et al*., 2020; Roundy *et al*., 2018; Wurth *et al*., 2022).

Therefore, the study aimed to reveal and compare the entrepreneurial ecosystem configurations associated with high levels of regional business density and high-growth firms in both urban and non-urban regions using necessary condition analysis (NCA) and fuzzy-set qualitative comparative analysis (fs/QCA). This article is divided into four sections. The first section will provide an overview of relevant literature on EE structure and complexity. The second section will introduce the research method and the data employed. The third section will present and discuss the results of NCA and fs/QCA. The final section will present the main conclusions of the study.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Entrepreneurial Ecosystem's Structure and Complexity

Existing research recognizes that successful entrepreneurship is not solely dependent on individual entrepreneurs but is influenced by several surrounding environmental conditions and support structures. This recognition has led to the emergence of a novel concept that laid the foundations for a systemic view of entrepreneurship, known as the entrepreneurial ecosystem (EE). An EE refers to a 'set of interdependent actors and factors coordinated in such a way that they enable productive entrepreneurship within a particular territory' (Stam & Spigel, 2018). Building on the concept of EEs, researchers elaborated several conceptual frameworks aiming to define EE from different perspectives (*e.g.* Ács *et al*., 2014; Stam, 2015; Isenberg, 2016; Kauffman's foundation ecosystem model or Kantis *et al*., 2021). Overall, researchers in this field agree that entrepreneurship is a complex phenomenon influenced by a wide range of factors, including a population with entrepreneurial attitudes, abilities, and aspirations, supportive policies and regulations, access to finance, supportive culture, well-developed infrastructure, skilled human capital, effective networks, adequate educational systems, market, and innovation platforms. Moreover, healthy ecosystems are expected to promote entrepreneurship as an outcome, and entrepreneur-

ial outcomes can take various forms, such as more entrepreneurs, more firms, or more jobs (Bell-Masterson & Stangler, 2015), productive entrepreneurship, aggregate value creation (Stam & van de Ven, 2021), or quantity and quality entrepreneurship (Szerb *et al*., 2019).

Despite the evident progress in research on EEs, this field is still evolving, with several knowledge gaps and questions to be answered. One notable criticism of EE research is its primary focus on advanced economies when conceptualizing and operationalizing ecosystems (Aldrich & Ruef, 2018; Audretsch, 2021). Some scholars suggest that current theoretical frameworks for understanding and measuring EEs are not context-sensitive. They argue that these models are defined by a standard set of elements derived from ecosystems in large, urbanized regions and well-developed metropolitan areas, primarily located in developed economies. As a result, the possible relevance and differentiated role of other context-specific elements are diminished. Consequently, the existing knowledge about EEs may lack contextualization and be insufficient for explaining the factors and mechanisms that affect, for example, rural entrepreneurship (Miles & Morrison, 2020; Muñoz & Kimmitt, 2019). In this regard, the literature suggests that despite the challenges that socio-economic and developmental disparities among urban and non-urban contexts pose, non-urban settings are fertile ground for entrepreneurial activities due to the availability of valuable, unique natural and human resources that can be strategically utilized for productive entrepreneurial purposes (Milone & Ventura, 2019; Müller & Korsgaard, 2018; Pato & Teixeira, 2016; Roundy, 2019). Nonetheless, the distinctive socioeconomic and geographic characteristics of urban and rural regions can certainly give rise to disparities in entrepreneurial dynamics. Factors such as urbanization, agglomeration (Fotopoulos & Louri, 2000; Lavesson, 2018), the gap in access to digital infrastructure (McCoy *et al*., 2018), gender dynamics (Birdthistle *et al*., 2022), rural poverty, territorial capital, peripheral location (Calispa-Aguilar, 2021), and limited access to venture capital may have varying impacts on how entrepreneurship unfolds in non-urban settings. Consequently, there is a growing need to understand how the specificities of non-urban locations, such as smaller towns or rural areas, might impact entrepreneurship development (Muñoz *et al*., 2022; Roundy, 2017; Roundy *et al*., 2018).

Another issues contributing to the decontextualization of EE framework models are the assumptions that all ecosystems work in the same way, and each EE element has the same relevance for a successful ecosystem. However, EEs are conceptualized as unique, heterogeneous, complex, and adaptive systems (Alvedalen & Boschma, 2017; Daniel *et al*., 2022; Jacobides *et al*., 2018; Stephens *et al., 2022)*. In this respect, research suggests that certain ecosystem elements may be more or less important in enabling entrepreneurship depending on the regional context (Spigel, 2017). In fact, researchers have begun to investigate EEs using a configurational approach, aiming to understand how factors within specific territories interact to support or hinder entrepreneurship (González-Tejero *et al.*, 2022; Heredia-Portillo & Armas-Arévalos, 2023). In this regard, qualitative comparative analysis (QCA) and necessity condition analysis (NCA) have been recognized as well-established methods that offer a feasible methodological solution for studying the diversity of different types of ecosystems (Coduras *et al*., 2016; Spigel *et al.*, 2020). It is increasingly common to find studies that employ NCA and QCA together to reveal both whether all or some of the ecosystem conditions are necessary for a desired outcome and how the conditions combine to produce the outcome. Two important themes emerge from the results of these types of studies. Firstly, findings show that not all ecosystem elements are always necessary to foster entrepreneurship. Several studies corroborate that some EE elements are more important in creating the conditions necessary for entrepreneurship depending on the specific context of the ecosystem or the expected entrepreneurial output. For instance, in a recent study aiming to identify the ways to a successful EE in Europe, Schrijvers *et al*. (2023) revealed that, out of ten, only two ecosystem conditions (leadership and intermediate services) are necessary for very high-performing ecosystems. There are also cases, in which researchers found that no single condition was necessary for explaining entrepreneurship (Muñoz *et al*., 2022; Xie *et al*., 2021).

Secondly, an increasing number of studies show that the combination of elements required for fostering entrepreneurship most often does not include the presence of all relevant factors, challenging, in this way, the well-known completeness logic that suggests that in successful, healthy ecosystems all ecosystem elements must be present in a balanced way (Ács *et al*., 2014). There is

evidence that in certain regions, having all elements at a high level is not a precondition for EE success, as regions can achieve high levels of productive entrepreneurship even without having one or two ecosystem elements at a high level (Schrijvers *et al*., 2023). An increasing number of publications also show that the 'recipes' that lead to high levels of entrepreneurial outcomes usually include a combination of a few ecosystem elements rather than all of them (Alves *et al*., 2019; Komlósi *et al*., 2022; March-Chordà *et al*., 2021; Yang & Zhang, 2021).

Moreover, several studies have employed more than one entrepreneurial output measurement in their QCA models and explored the differences in the ecosystems' configurations between these outcomes. In this context, some researchers have differentiated their entrepreneurial outcome variables by setting 'permissive and strict' (Komlósi *et al*., 2022) or 'Top 25 and Top 10' (Schrijvers *et al*., 2023) thresholds to differentiate high and very high outcome levels. Others have employed different output variables, such as in the case of Torres and Godinho (2022), who evaluated the necessity levels of eight elements of digital entrepreneurial ecosystems for enabling digitally-enabled unicorns, unicorns in general, and new business creation. Importantly, what these studies show is that both necessity and sufficiency configurations change depending on the desired output in several ways. Overall, it seems that the higher (stricter) the desired output, the more convergence there is to an all-round ecosystem where all the ecosystem's components must be well-developed.

Finally, it is important to note that to date, much of the research employing configurational approaches to investigate the functioning of EEs has primarily focused on identifying how EE facilitates entrepreneurship within a specific location. Nevertheless, there is a notable gap in the literature, as no previous study has undertaken a comparative analysis of EE performance across diverse locations or contexts, including comparisons between urban and non-urban regions, large and small cities, various industrial sectors, or over different periods. Therefore, this study aimed to contribute to the literature by studying the differences in the configurations (combinations of factors) associated with high levels of regional business density and high-growth firms in both urban and non-urban regions. Based on the literature review, I propose:

Proposition* 1*: Entrepreneurial ecosystems work differently in urban and non-urban regions.

Proposition* 1.1*: The necessary factors for high levels of entrepreneurship are different between urban and non-urban regions.

Proposition* 1.2*: Different combinations of factors lead to high levels of entrepreneurship in urban and non-urban regions.

RESEARCH METHODOLOGY

This study employed fs/QCA (Ragin, 2008; Rihoux & Ragin, 2009) and NCA (Dul, 2016). The purpose of the QCA analysis of sufficiency is to find the minimal configurations of conditions that are sufficient for a given outcome. Necessity refers to the fact that while several conditions impact the causal structure of social phenomena, some conditions are more important than others. Some are so important, that the outcome is impossible in their absence (Duşa, 2022).

Research Settings

In this research, I used the six domains of EE (Isenberg, 2016) to explore the configurations of EE elements that lead to high levels of regional entrepreneurship. Culture, support, human capital, policy, markets and, finance are posited to interact in ways that foster and sustain entrepreneurship (Isenberg, 2016). As Figure 1 shows, the fs/QCA model consists of six domains and two outcome measures. I measured the outcomes using two proxies for entrepreneurship: regional business density and the regional share of high-growth firms. I selected these indicators based on the concepts of 'Kirznerian' and 'Schumpeterian' entrepreneurship proposed by Szerb *et al*. (2019). The analytical stage includes two steps: first to test whether all six conditions (EE domains) were necessary for high levels of high regional business density and high regional share of high-growth firms. After defining the necessary conditions, the second step was to reveal and analyse the ecosystem configurations sufficient for high levels of high regional business

density and high regional share of high-growth firms. In QCA, causality is not assumed to be symmetrical and the presence and the absence of the outcome may require different explanations (Berg-Schlosser *et al*., 2009). However, since I focused on the factors that lead to the presence of high levels of entrepreneurship, I did not include a discussion of the results regarding the factors that lead to low levels of the outcome nor the absence of the outcome.

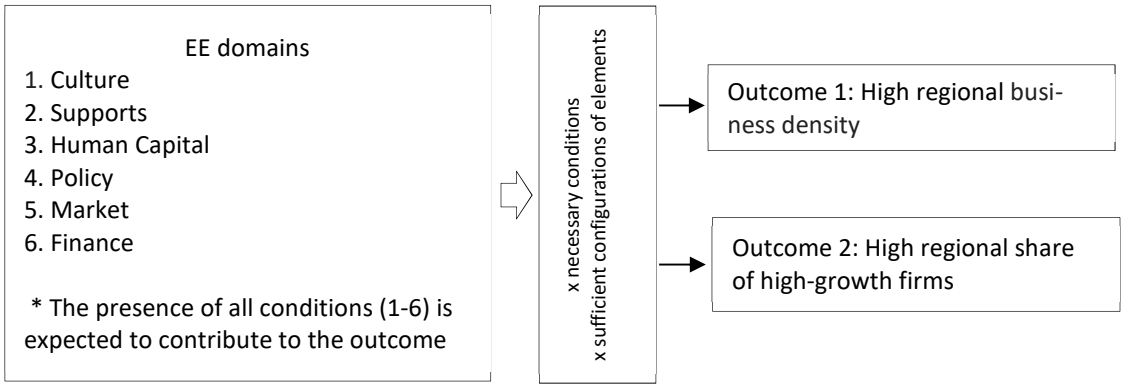

Figure 1. Six conditions of fs/QCA research model for quantity and quality entrepreneurship
Source: own elaboration.

Data

Regional entrepreneurship results from the interplay between individuals' attitudes and environmental factors. In this context, favourable institutional conditions are important, but people are crucial, as are the entrepreneurs who bring about entrepreneurship in a trial-and-error dynamic. Therefore, empirical analyses must encompass both individual and institutional components (Ács *et al*., 2014; Davidsson, 2016). The measures for the six conditions and two outcome variables are constructed by combining individual-level data from the global entrepreneurship monitor (GEM) adult population survey from 2010-2017 and institutional data from various local, regional, and international databases, as shown in Table A1 in the appendix. This study includes a total of 42 subnational regions in Ecuador and Colombia: 23 regions (provinces) in Ecuador and 19 regions (departments) in Colombia. Two separate analyses are performed to study differences in the configurations of ecosystems in 17 predominantly urban regions (PU) and in 25 non-urban regions (NU), defined as regions where the share of the population living in rural areas is below 35% or where the share of the population living in rural areas is higher than 35% correspondingly. For the full list of regions and the raw data employed, please refer to Table A2 in the appendix.

I performed the necessity analysis using the NCA package in R and the sufficiency analysis – using fs/QCA 4.1 software. Raw data were calibrated adopting the QCA direct method of calibration, specifying three qualitative breakpoints: full membership, full non-membership, and the crossover point (Ragin, 2008). In line with previous studies (Komlósi *et al*., 2022; Pappas & Woodside, 2021; Schrijvers *et al*., 2023), I used sample statistics to determine the calibration thresholds. The 75th percentile for full membership, the 50th percentile for the crossover point, and the 25th percentile for full non-membership, as displayed in Table 1. This calibration approach is suitable for this dataset because EEs in Ecuador and Colombia are known to have a medium level of performance (Ács *et al*., 2018), resulting in a positively skewed distribution. Therefore, setting calibration thresholds based on global external benchmarks could lead to decontextualized QCA results. Truth tables were built from the calibrated data matrices with a sufficiency inclusion score of ≥ 0.8 and at least 1 case per row.

Table 1. Descriptive statistics

Variable	Mean		St.Dev		Min		Max		Pctl 75		Pctl 25	
	PU	NU	PU	NU	PU	NU	PU	NU	PU	NU	PU	NU
Culture	0.535	0.477	0.066	0.071	0.421	0.397	0.639	0.681	0.590	0.492	0.484	0.445
Supports	0.353	0.192	0.098	0.097	0.162	0.067	0.469	0.433	0.458	0.265	0.312	0.130
Human Capital	0.452	0.375	0.061	0.086	0.341	0.276	0.602	0.683	0.477	0.426	0.428	0.328
Policy	0.522	0.411	0.112	0.099	0.340	0.240	0.824	0.614	0.566	0.489	0.458	0.398
Market	0.321	0.208	0.097	0.116	0.185	0.048	0.473	0.499	0.415	0.326	0.240	0.149
Finance	0.424	0.362	0.065	0.086	0.237	0.165	0.504	0.520	0.475	0.436	0.414	0.337
Business density	0.037	0.050	0.029	0.034	0.018	0.010	0.094	0.106	0.057	0.091	0.024	0.080
High-growth firms	0.196	0.082	0.129	0.134	0.042	0.000	0.387	0.360	0.333	0.237	0.085	0.043

Note: PU = predominantly urban, NU= non-urban.
Source: own study.

RESULTS AND DISCUSSION

Necessary Conditions

The NCA results revealed that no single condition was necessary (*i.e.* had a very high size effect) for explaining high levels of quantity entrepreneurship measured as regional business density. This holds true for both types of ecosystems, *i.e.* predominantly urban and non-urban. As depicted in Table 2, the NCA results display very low size effect scores for all six dimensions of the ecosystem. This does not imply that the six dimensions of the ecosystem are unimportant for business creation. Rather, it indicates that quantity entrepreneurship can be achieved in a region even when these components work at minimal levels. In other words, a high-performing entrepreneurial ecosystem is not a prerequisite for achieving high levels of business density in a region.

Conversely, ecosystem conditions become necessary (*i.e.* have a large effect) when the expected outcome is high levels of quality entrepreneurship, measured as the regional share of high-growth firms. This holds true for both types of ecosystems, urban and non-urban. These findings suggest that supporting the rise of high levels of quality entrepreneurship is more demanding in terms of minimum necessary conditions. Unlike quantity entrepreneurship, achieving a high regional share of high-growth firms requires ecosystems where several components must be present for the outcome to occur. More specifically, in urban regions, culture, support, and finance are necessary for high rates of regional high-growth firms. Similarly, culture and market are necessary for supporting a high share of high-growth firms in non-urban regions. Together, these results provide evidence that supports Proposition 1.1.

Table 2. Results of necessary condition analysis: Urban and non-urban groups

Ecosystem dimension	Quantity entrepreneurship				Quality entrepreneurship			
	Business Density				High-growth firms			
	Urban		Non-Urban		Urban		Non-Urban	
	effect size	p	effect size	p	effect size	p	effect size	p
Culture	0.00	0.92	0.00	1.00	0.39	0.00	0.40	0.00
Supports	0.02	0.80	0.03	0.63	0.46	0.00	0.02	0.81
Human Capital	0.02	0.79	0.07	0.13	0.21	0.03	0.07	0.38
Policy	0.14	0.44	0.00	0.88	0.14	0.14	0.19	0.25
Market	0.00	0.88	0.01	0.89	0.29	0.00	0.41	0.00
Finance	0.17	0.72	0.21	0.11	0.32	0.16	0.25	0.30

Note: General qualifications for the size of an effect as 'small,' 'medium,' or 'large' are disputable. If, nevertheless, a researcher wishes to have a general benchmark for necessary condition effect size the following ranges are suggested: $0 < d < 0.1$ as a 'small effect,' $0.1 \leq d < 0.3$ as a 'medium effect,' $0.3 \leq d < 0.5$ as a 'large effect,' and $d \geq 0.5$ as a 'very large effect' (Dul, 2016). Values showing large effect are highlighted. Effect size scores are calculated with cr_fdh ceiling technique, p= p-value.
Source: own study.

Fs/QCA analysis of sufficient conditions

The results of the sufficiency analysis are presented using the so-called 'Fiss-style tables.' In these tables, each column represents an alternative causal recipe, where ● indicates the presence of a condition, ⊗ indicates its absence, and no circle indicates indifference toward that condition. Distinguishing large circles are employed to emphasize core conditions over peripheral ones. Core conditions are those present in both parsimonious and intermediate solutions, and the evidence indicates a strong causal relationship with the outcome of interest. Conversely, peripheral conditions are present only in the intermediate solution, and the evidence for a causal relationship with the outcome is weaker (Fiss, 2011). Consistency, also referred to as the 'inclusion' level, pertains to the percentage of causal configurations with similar compositions resulting in the same outcome value. In other words, the consistency coefficient expresses the proportion of cases exhibiting a given combination of causal conditions that also exhibit the outcome of interest. Therefore, the higher the consistency score, the greater the reliability of the sufficiency of a causal path for the outcome. In fsQCA, a solution is deemed informative when consistency is above 0.74 (Woodside, 2013).

Results from the fs/QCA sufficiency analysis provide evidence supporting Proposition 1.2. Entrepreneurship, both in quality and quantity, results from different ecosystem configurations in urban regions compared to non-urban regions. As depicted in Table 3, for high levels of regional business density in urban regions, there is only one sufficient configuration where all the components are indifferent to the outcome. This suggests that urban regions may potentially have an ecosystem enabling high rates of business density without requiring additional efforts to achieve high-performance levels in any of the ecosystem components. These findings align with previous studies establishing a connection between entrepreneurship and urban and agglomeration economies. The advantages of agglomeration in cities arise from the sharing of facilities, inputs, infrastructure, and a larger labour pool. Agglomeration allows workers and employers to better match their skills and needs within a broader labour pool, while firms can more readily acquire knowledge about new technologies and business practices in a larger market (Andersson & Karlsson, 2007; Audretsch *et al*., 2015; Glaeser *et al*., 2012). In this context, the pre-existence of these spatial arrangements is crucial for successful entrepreneurial discovery and implementation. In cities, this 'entrepreneurial base' is already functional, increasing the likelihood of successfully implementing a business due to ready access to key inputs. Furthermore, besides the advantages offered by urbanization, the spatial sorting of people and economic activities could also explain high start-up rates in urban areas (Hans & Koster, 2018).

Regarding high levels of regional business density in non-urban regions, there are six sufficient configurations (2a-2f) where two types of solutions are identified based on their main driver. In the absence of supportive policy the presence of finance becomes core (2a-2c) and, in the absence of supportive culture, the presence of policy becomes core (2d-2f). These findings suggest that since non-urban regions cannot fully benefit from the agglomeration of talent, and supporting services as predominantly urban regions can, additional efforts from the government such as improving policy to ease doing business or facilitate access to finance are required to foster higher business density.

As depicted in Table 4, five distinct paths lead to achieving a high level of high-growth firms in urban regions. Solution 3a is based on the presence of support and finance while solutions 3b to 3e are based on the absence of supportive policy combined with the strong presence of all the other factors in different combinations. These findings suggest that while agglomeration in predominantly urban regions facilitates quantity entrepreneurship, this effect alone may not be a sufficient catalyst for attaining high levels of high-growth firms. This conclusion aligns with other research indicating that the formation and scale-up activity of high-growth firms, often referred to as 'gazelles,' in developing countries require a highly supportive ecosystem where finance, knowledge, marketization in the local economy, and demand play crucial roles (Mason & Brown, 2014; Zhang & Roelfsema, 2020). For non-urban regions, three potential paths lead to the outcome, with the overarching role played by the presence of supportive culture and good access to the market, identified as core in all three solutions. The first path (4a) outlines a configuration where culture, support, human capital, and finance are

required when good access to finance is absent. Conversely, configurations 4b and 4c illustrate ways to reach the outcome in the absence of human capital.

Table 3. Configurations for achieving a high regional level of business density

Dimension	Urban	Non-Urban					
	1a	2a	2b	2c	2d	2e	2f
Culture	⊗	–	•	⊗	⊗	⊗	⊗
Supports	⊗	⊗	⊗	•	⊗	•	•
Human Capital	⊗	⊗	⊗	•	•	•	
Policy	⊗	⊗	⊗	⊗	●	●	●
Market	⊗	⊗		⊗	•	•	⊗
Finance	⊗	●	●	●	⊗	•	⊗
Raw coverage	0.384	0.235	0.154	0.143	0.087	0.138	0.141
Unique coverage	0.384	0.145	0.067	0.120	0.031	0.114	0.080
Consistency	0.895	1.000	1.000	1.000	0.898	0.989	0.894
Overall solution coverage	0.384	0.690	–	–	–	–	–
Overall solution consistency	0.895	0.970	–	–	–	–	–
Regions	El Oro, Santo Domingo, Guayas	Orellana, Napo, Carchi	Bolivar (EC), Napo	Zamora Chinchipe	Manabí	Pastaza, Tungu-rahua	Chimbo-razo, Ca-ñar

Source: own study.

Importantly, good access to the market, measured in this study by indicators of networking, export capacity, and the newness of production, emerges as the most critical factor for both types of regions. Its presence is core in three paths (solutions 3b, 3c, 3d) for urban regions and in all solutions for non-urban regions. This suggests that businesses in Colombia and Ecuador need to sustain their growth through external markets to become high-growth firms. Indeed, these results align with studies finding that in many developing countries factors such as export orientation are particularly relevant for the growth of new ventures because the generally small domestic markets within these countries cannot support a large number of high-growth firms serving only the local market (Lecuna *et al*., 2017). Therefore, a high capacity to access international markets and the ability to develop innovative products within a region become crucial for sustaining high growth.

The outcomes of this study can significantly contribute to enhancing the understanding of entrepreneurship policy optimization and ecosystem governance. Firstly, after recognizing that not all elements within an entrepreneurial ecosystem are equally important for achieving high levels of entrepreneurship, it becomes imperative for policymakers to design tailored strategies that align with the unique characteristics and requirements of each region. Rather than adopting generic policy approaches, such as blindly investing in boosting some ecosystem aspects or pursuing a balanced ecosystem where all dimensions perform at a high level, the focus should be on creating a supportive environment where the very specific needs, and the necessary elements in the region are addressed. Necessary conditions are vital, and other conditions cannot compensate for their absences.

Secondly, policy initiatives need to concentrate on formulating region-specific strategies by considering the unique combinations of factors that contribute to desired outcomes, such as high business density or the emergence of high-growth firms. Furthermore, the policymaking process should be flexible enough to adapt to the diverse needs of entrepreneurs across different regions, given that paths to high entrepreneurship levels vary between urban and non-urban areas. Resource allocation may need to be customized based on the urban-rural typology of each region. These findings align with existing research, suggesting that there is no universally applicable instrument guaranteeing success in increasing the entrepreneurship level. Decision-makers should tailor policies to support entrepreneurship development recognizing that different sets of instruments are required for rural and non-rural areas (Rodzinka *et al*., 2023; Skica & Rodzinka, 2021).

Table 4. Configurations for achieving a high regional level of high-growth firms

Dimension	Urban					Non-Urban		
	3a	3b	3c	3d	3e	4a	4b	4c
Culture	•	⊗	⊗	●	●	●	●	●
Supports	●	●	⊗	•	⊗	●	●	⊗
Human Capital	•	⊗	⊗	●	●	●	⊗	⊗
Policy	•	⊗	⊗	⊗	⊗	□	•	⊗
Market	□	●	●	●	⊗	●	●	●
Finance	●	●	⊗	⊗	⊗	⊗	●	●
Raw coverage	0.340	0.103	0.140	0.158	0.125	0.272	0.201	0.111
Unique coverage	0.270	0.025	0.050	0.070	0.074	0.245	0.170	0.096
Consistency	0.940	0.876	0.910	1.000	1.000	0.923	0.957	0.968
Overall solution coverage	0.620	–	–	–	–	0.543	–	–
Overall solution consistency	0.930	–	–	–	–	0.952	–	–
Regions	Santander, Cundinamarca, Risaralda	Norte de Santander	Magdalena	Atlántico	Bolívar (CO)	Nariño, La Guajira	Amazonas, Huila	Bolívar (EC)

Source: own study.

CONCLUSIONS

This study investigated the differences in the configuration of ecosystems associated with high levels of regional business density and high-growth firms in urban and non-urban regions in Colombia and Ecuador, employing NCA and fs/QCA. The findings indicated distinct necessary conditions and paths for entrepreneurship in urban and non-urban regions, supporting the main research proposition that entrepreneurial ecosystems operate differently in these settings.

Firstly, necessity analysis provided evidence to support the proposition that necessary factors for high levels of entrepreneurship differ between urban and non-urban regions. The NCA results revealed that no single condition was necessary for achieving high levels of regional business density. In contrast, achieving a high regional share of high-growth firms required the presence of several components. In urban regions, supportive culture, support, and access to finance were deemed necessary, while supportive entrepreneurial culture and good access to the market were found to be crucial for high-growth firms in non-urban regions. These findings agree with previous results showing that while all elements of an ecosystem are important for entrepreneurship, not all of them are always necessary. Secondly, sufficiency analysis unveiled various paths to attain high levels of entrepreneurship, providing evidence to support the proposition that different combinations of factors lead to high entrepreneurship levels in urban and non-urban regions. Notably, fostering high-growth firms in non-urban regions is relatively more challenging than in urban regions since all the paths include the presence of high levels in four out of the six ecosystem dimensions. This finding is consistent with research that highlights that the challenges of fostering entrepreneurship in economically weak places are much greater operationally than in already prosperous places (Ortega-Argilés, 2022). These findings also corroborate previous research suggesting that thriving entrepreneurial communities can be developed in small towns that lack certain elements traditionally associated with entrepreneurial ecosystems (Roundy, 2017). This study revealed how each ecosystem 'finds its own way' to function with a unique combination of elements, and non-urban ecosystems can function and succeed even without having all the 'classic' pillars of EEs found in large metropolises.

This study's academic implications contribute to the growing body of literature on entrepreneurial ecosystems in developing economies, particularly in the South American context. Finally, some limitations should be acknowledged, including the broad definition of urban-non-urban typology based on

the share of rural population and the study's geographical focus on Colombia and Ecuador. In this regard, the practical application of the results of the research can only be directly applied among regions within these two countries. I also acknowledge that although QCA technical decisions were based on previous empirical evidence and theoretical arguments, the result of fs/QCA analysis are delimited by my choices of case and conditions and fuzzy set calibration thresholds. Future research could enhance the validity of these QCA results by employing a bigger sample size, different or additional ecosystem components, or data from more specific geographical units such as cities, smaller cities, or towns. It would also be interesting to repeat this study using coincidence analysis (CNA).

REFERENCES

Ács, Z., Autio, E., & Szerb, L. (2014). National Systems of Entrepreneurship: Measurement issues and policy implications. *Research Policy*, *43*(3), 476-494. https://doi.org/10.1016/j.respol.2013.08.016

Ács, Z., Desai, S., & Hessels, J. (2008). Entrepreneurship, economic development and institutions. *Small Business Economics*, *31*(3), 219-234. https://doi.org/10.1007/s11187-008-9135-9

Ács, Z., Szerb, L., Lafuente, E., & Lloyd, A. (2018). *Global Entrepreneurship and Development Index 2018*. Springer International Publishing. https://doi.org/10.1007/978-3-030-03279-1

Aldrich, H.E., & Ruef, M. (2018). Unicorns, Gazelles, and Other Distractions on the Way to Understanding Real Entrepreneurship in America. *The Academy of Management Perspectives*, *32*(4), 458-472. https://doi.org/10.5465/amp.2017.0123

Alvedalen, J., & Boschma, R. (2017). A critical review of entrepreneurial ecosystems research: Towards a future research agenda. *European Planning Studies*, *25*(6), 887-903. https://doi.org/10.1080/09654313.2017.1299694

Alves, A.C., Fischer, B., Vonortas, N.S., & Robles, S. (2019). Configurations of Knowledge-Intensive Entrepreneurial Ecosystems. *RAE-Revista de Administração de Empresas (Journal of Business Management) ANDRE*, *59*(August), 242-257. https://doi.org/10.1590/S0034-759020190403

Andersson, M., & Karlsson, C. (2007). Knowledge in Regional Economic Growth—The Role of Knowledge Accessibility. *Industry & Innovation*, *14*(2), 129-149. https://doi.org/10.1080/13662710701252450

Audretsch, D. (2021). Have we oversold the Silicon Valley model of entrepreneurship?. *Small Business Economics*, *56*(2), 849-856. https://doi.org/10.1007/s11187-019-00272-4

Audretsch, D., Belitski, M., & Desai, S. (2015). Entrepreneurship and economic development in cities. *Annals of Regional Science*, *55*(1), 33-60. https://doi.org/10.1007/s00168-015-0685-x

Autio, E., Szerb, L., Komlosi, E., & Tiszberger, M. (2018). *The European Index of Digital Entrepreneurship Systems*. Publications Office of the European Union. https://doi.org/10.2760/39256

Bell-Masterson, J., & Stangler, D. (2015). Measuring an Entrepreneurial Ecosystem. *SSRN Electronic Journal*, *March*. https://doi.org/10.2139/ssrn.2580336

Berger, E., & Kuckertz, A. (2016). The Challenge of Dealing with Complexity in Entrepreneurship, Innovation and Technology Research: And introduction. In *Complexity in entrepreneurship, innovation and technology research* (pp. 1-9).

Berg-Schlosser, D., De Meur, G., Rihoux, B., & Ragin, C. (2009). Qualitative Comparative Analysis (QCA) as an Approach. In *Configurational Comparative Methods* (pp. 1-18). SAGE.

Birdthistle, N., Eversole, R., & Walo, M. (2022). Creating an inclusive entrepreneurial ecosystem for women entrepreneurs in a rural region. *Journal of Business Venturing Insights*, *18*, e00341. https://doi.org/10.1016/j.jbvi.2022.e00341

Brown, R., & Mason, C. (2017). Looking inside the spiky bits: A critical review and conceptualisation of entrepreneurial ecosystems. *Small Business Economics*, *49*(1), 11-30. Scopus. https://doi.org/10.1007/s11187-017-9865-7

Calispa-Aguilar, E. (2021). Rural entrepreneurial ecosystems: A systematic literature review for advancing conceptualisation. *Entrepreneurial Business and Economics Review*, *9*(4), 101-114. https://doi.org/10.15678/EBER.2021.090407

Cao, Z., & Shi, X. (2021). A systematic literature review of entrepreneurial ecosystems in advanced and emerging economies. *Small Business Economics*, *57*(1), 75-110. Scopus. https://doi.org/10.1007/s11187-020-00326-y

Cavallo, A., Ghezzi, A., & Balocco, R. (2019). Entrepreneurial ecosystem research: Present debates and future directions. *International Entrepreneurship and Management Journal*, *15*(4), 1291-1321. https://doi.org/10.1007/s11365-018-0526-3

Coduras, A., Clemente, J.A., & Ruiz, J. (2016). A novel application of fuzzy-set qualitative comparative analysis to GEM data. *Journal of Business Research*, *69*(4), 1265-1270. https://doi.org/10.1016/j.jbusres.2015.10.090

Daniel, L.J., De Villiers Scheepers, M.J., Miles, M.P., & De Klerk, S. (2022). Understanding entrepreneurial ecosystems using complex adaptive systems theory: Getting the big picture for economic development, practice, and policy. *Entrepreneurship & Regional Development*, *34*(9-10), 911-934. https://doi.org/10.1080/08985626.2022.2083691

Davidsson, P. (2016). *Researching Entrepreneurship: Conceptualization and Design* (2nd ed.). Springer International Publishing Switzerland.

Douglas, E.J., Shepherd, D.A., & Prentice, C. (2020). Using fuzzy-set qualitative comparative analysis for a finer-grained understanding of entrepreneurship. *Journal of Business Venturing*, *35*(1), 105970. https://doi.org/10.1016/j.jbusvent.2019.105970

Dul, J. (2016). Necessary condition analysis (NCA) logic and methodology of "necessary but not sufficient" causality. *Organizational Research Methods*, *19*(1), 10-52. https://doi.org/10.1177/1094428115584

Duşa, A. (2022). Analysis of necessity. In *QCA with R: A Comprehensive Resource* (pp. 113-139).

Fiss, P. (2011). Building Better Causal Theories: A Fuzzy Set Approach to Typologies in Organization Research. *Academy of Management Journal*, *54*(2), 393-420. https://doi.org/10.5465/amj.2011.60263120

Fotopoulos, G., & Louri, H. (2000). Location and Survival of New Entry. *Small Business Economics*, *14*(4), 311-321. https://doi.org/10.1023/A:1008180522759

Freire-Gibb, L.C., & Gregson, G. (2019). Innovation systems and entrepreneurial ecosystems: Implications for policy and practice in Latin America. *Local Economy: The Journal of the Local Economy Policy Unit*, *34*(8), 787-806. https://doi.org/10.1177/0269094219896096

Glaeser, E.L., Ponzetto, G.A.M., & Tobio, K. (2012). Cities, Skills and Regional Change. *Regional Studies*, 1-37. https://doi.org/10.1080/00343404.2012.674637

González-Tejero, C.B., Ulrich, K., & Carrilero, A. (2022). The entrepreneurial motivation, Covid-19, and the new normal. *Entrepreneurial Business and Economics Review*, *10*(2), 205-217. https://doi.org/10.15678/EBER.2022.100212

Guerrero, M., Liñán, F., & Cáceres-Carrasco, F.R. (2021). The influence of ecosystems on the entrepreneurship process: A comparison across developed and developing economies. *Small Business Economics*, *57*(4), 1733-1759. https://doi.org/10.1007/s11187-020-00392-2

Haarhaus, T., Strunk, G., & Liening, A. (2020). Assessing the complex dynamics of entrepreneurial ecosystems: A nonstationary approach. *Journal of Business Venturing Insights*, *14*, e00194. https://doi.org/10.1016/j.jbvi.2020.e00194

Hans, L., & Koster, S. (2018). Urbanization and start-up rates in different geographies: Belgium, the Netherlands, and Sweden. *Small Business Economics*, *51*(4), 1033-1054. https://doi.org/10.1007/s11187-017-9967-2

Heredia-Portillo, O., & Armas-Arévalos, E. (2023). Explaining the international opportunity recognition with the qualitative comparative analysis: The role of dynamic capabilities self-efficacy and global mindset. *Entrepreneurial Business and Economics Review*, *11*(1), 29-56. https://doi.org/10.15678/EBER.2023.110102

Isenberg, D. (2016). Applying the Ecosystem Metaphor to Entrepreneurship: Uses and Abuses. *The Antitrust Bulletin*, *61*(4), 564-573. https://doi.org/10.1177/0003603X16676162

Jacobides, M.G., Cennamo, C., & Gawer, A. (2018). Towards a theory of ecosystems. *Strategic Management Journal*, *39*(8), 2255-2276. https://doi.org/10.1002/smj.2904

Kantis, H., Federico, J., & Ibarra-García, S. (2021). *IDE Index of Dynamic Entrepreneurship 2021*. Prodem and Global entrepreneurship network. Retrieved from https://prodem.ungs.edu.ar/publicaciones_prodem/index-of-dynamic-entrepreneurship-ide-ide-2021/ on January 5, 2024.

Komlósi, É., Sebestyén, T., Tóth-Pajor, Á., & Bedő, Z. (2022). Do specific entrepreneurial ecosystems favor high-level networking while others not? Lessons from the Hungarian IT sector. *Technological Forecasting and Social Change*, *175*, 121349. https://doi.org/10.1016/j.techfore.2021.121349

Lavesson, N. (2018). How does distance to urban centres influence necessity and opportunity-based firm start-ups?: Distance to urban centres and firm start-ups. *Papers in Regional Science*, *97*(4), 1279-1303. https://doi.org/10.1111/pirs.12289

Lecuna, A., Cohen, B., & Chavez, R. (2017). Characteristics of high-growth entrepreneurs in Latin America. *International Entrepreneurship and Management Journal*, *13*(1), 141-159. https://doi.org/10.1007/s11365-016-0402-y

Malecki, E. (2018). Entrepreneurship and entrepreneurial ecosystems. *Geography Compass*, *12*(3). https://doi.org/10.1111/gec3.12359

March-Chordà, I., Adame-Sánchez, C., & Yagüe-Perales, R.M. (2021). Key locational factors for immigrant entrepreneurs in top entrepreneurial ecosystems. *International Entrepreneurship and Management Journal*, *17*(3), 1049-1066. Scopus. https://doi.org/10.1007/s11365-021-00746-6

Mason, C., & Brown, R. (2014). *Entrepreneurial Ecosystems and Growth Oriented Entrepreneurship* (pp. 77-102) [Final report to OECD, Paris].

McCoy, D., Lyons, S., Morgenroth, E., Palcic, D., & Allen, L. (2018). The impact of broadband and other infrastructure on the location of new business establishments. *Journal of Regional Science*, *58*(3), 509-534. https://doi.org/10.1111/jors.12376

Miles, M.P., & Morrison, M. (2020). An effectual leadership perspective for developing rural entrepreneurial ecosystems. *Small Business Economics*, *54*(4), 933-949. Scopus. https://doi.org/10.1007/s11187-018-0128-z

Milone, P., & Ventura, F. (2019). New generation farmers: Rediscovering the peasantry. *Journal of Rural Studies*, *65*, 43-52. https://doi.org/10.1016/j.jrurstud.2018.12.009

Müller, S., & Korsgaard, S. (2018). Resources and bridging: The role of spatial context in rural entrepreneurship. *Entrepreneurship & Regional Development*, *30*(1-2), 224-255. https://doi.org/10.1080/08985626.2017.1402092

Muñoz, P., Kibler, E., Mandakovic, V., & Amorós, J.E. (2022). Local entrepreneurial ecosystems as configural narratives: A new way of seeing and evaluating antecedents and outcomes. *Research Policy*, *51*(9). https://doi.org/10.1016/j.respol.2020.104065

Muñoz, P., & Kimmitt, J. (2019). Rural entrepreneurship in place: An integrated framework. *Entrepreneurship & Regional Development*, *31*(9-10), 842-873. https://doi.org/10.1080/08985626.2019.1609593

Naudé, W. (2013). Entrepreneurship and Economic Development: Theory, Evidence and Policy. *IZA Discussion Paper*, *1*(7507), 1-20. https://doi.org/10.2139/ssrn.2314802

Pappas, I.O., & Woodside, A.G. (2021). Fuzzy-set Qualitative Comparative Analysis (fsQCA): Guidelines for research practice in Information Systems and marketing. *International Journal of Information Management*, *58*, 102310. https://doi.org/10.1016/j.ijinfomgt.2021.102310

Pato, M.L., & Teixeira, A.A.C. (2016). Twenty Years of Rural Entrepreneurship: A Bibliometric Survey: Twenty years of rural entrepreneurship. *Sociologia Ruralis*, *56*(1), 3-28. https://doi.org/10.1111/soru.12058

Ragin, C.C. (2008). Redesigning Social Inquiry: Fuzzy Sets and Beyond. In *Redesigning social inquiry: Fuzzy sets and beyond* (Issue 4). University of Chicago Press. https://doi.org/10.7208/chicago/9780226702797.001.0001

Rihoux, B., & Ragin, C. (2009). Configurational Comparative Methods: Qualitative Comparative Analysis (QCA) and Related Techniques. In *Configurational Comparative Methods: Qualitative Comparative Analysis (QCA) and Related Techniques*. Sage Publications. https://doi.org/10.4337/9781788975995.00034

Rodzinka, J., Skica, T., Ociepa-Kicińska, E., & Czyżycki, R. (2023). What works and what does not work in local entrepreneurship support policy?. *Entrepreneurial Business & Economics Review*, *11*(3). https://doi.org/10.15678/EBER.2023.110310

Roundy, P. (2017). "Small town" entrepreneurial ecosystems: Implications for developed and emerging economies. *Journal of Entrepreneurship in Emerging Economies*, *9*(3), 238-262. https://doi.org/10.1108/JEEE-09-2016-0040

Roundy, P. (2019). "It takes a village" to support entrepreneurship: Intersecting economic and community dynamics in small town entrepreneurial ecosystems. *International Entrepreneurship and Management Journal*, *15*(4), 1443-1475. Scopus. https://doi.org/10.1007/s11365-018-0537-0

Roundy, P., Bradshaw, M., & Brockman, B.K. (2018). The emergence of entrepreneurial ecosystems: A complex adaptive systems approach. *Journal of Business Research*, *86*, 1-10. https://doi.org/10.1016/j.jbusres.2018.01.032

Schrijvers, M., Stam, E., & Bosma, N. (2023). Figuring it out: Configurations of high-performing entrepreneurial ecosystems in Europe. *Regional Studies*, 1-15. https://doi.org/10.1080/00343404.2023.2226727

Skica, T., & Rodzinka, J. (2021). Local government policy towards the financial instruments supporting entrepreneurship. *Entrepreneurial Business and Economics Review*, *9*(3), 135-147. https://doi.org/10.15678/EBER.2021.090309

Spigel, B. (2017). The Relational Organization of Entrepreneurial Ecosystems. *Entrepreneurship: Theory and Practice*, *41*(1), 49-72. https://doi.org/10.1111/etap.12167

Spigel, B., Kitagawa, F., & Mason, C. (2020). A manifesto for researching entrepreneurial ecosystems. *Local Economy*, *35*(5), 482-495. Scopus. https://doi.org/10.1177/0269094220959052

Stam, E. (2015). Entrepreneurial Ecosystems and Regional Policy: A Sympathetic Critique. *European Planning Studies*, *23*(9), 1759-1769. https://doi.org/10.1080/09654313.2015.1061484

Stam, E., & Spigel, B. (2018). Entrepreneurial ecosystems. In *The SAGE Handbook of Small Business and Entrepreneurship*. SAGE.

Stam, E., & van de Ven, A. (2021). Entrepreneurial ecosystem elements. *Small Business Economics*, *56*(2), 809-832. https://doi.org/10.1007/s11187-019-00270-6

Stephens, S., McLaughlin, C., Ryan, L., Catena, M., & Bonner, A. (2022). Entrepreneurial ecosystems: Multiple domains, dimensions and relationships. *Journal of Business Venturing Insights*, *18*, e00344. https://doi.org/10.1016/j.jbvi.2022.e00344

Sternberg, R. (2022). Entrepreneurship and geography—Some thoughts about a complex relationship. *Annals of Regional Science*, *69*(3), 559-584. https://doi.org/10.1007/s00168-021-01091-w

Szerb, L., Lafuente, E., Horváth, K., & Páger, B. (2019). The relevance of quantity and quality entrepreneurship for regional performance: The moderating role of the entrepreneurial ecosystem. *Regional Studies*, *53*(9), 1308-1320. https://doi.org/10.1080/00343404.2018.1510481

Torres, P., & Godinho, P. (2022). Levels of necessity of entrepreneurial ecosystems elements. *Small Business Economics*, *59*(1), 29-45. https://doi.org/10.1007/s11187-021-00515-3

Villegas-Mateos, A. (2021). Regional entrepreneurial ecosystems in Chile: Comparative lessons. *Journal of Entrepreneurship in Emerging Economies*, *13*(1), 39-63. https://doi.org/10.1108/JEEE-11-2019-0168

Welter, F. (2011). Contextualizing entrepreneurship—Conceptual challenges and ways forward. *Entrepreneurship Theory and Practice*, *35*(1), 165-184. https://doi.org/10.1111/j.1540-6520.2010.0042

Woodside, A.G. (2013). Moving beyond multiple regression analysis to algorithms: Calling for adoption of a paradigm shift from symmetric to asymmetric thinking in data analysis and crafting theory. *Journal of Business Research*, *66*(4), 463-472. https://doi.org/10.1016/j.jbusres.2012.12.021

Wurth, B., Stam, E., & Spigel, B. (2022). Toward an Entrepreneurial Ecosystem Research Program. *Entrepreneurship Theory and Practice*, *46*(3), 729-778. https://doi.org/10.1177/1042258721998948

Xie, Z., Wang, X., Xie, L., & Duan, K. (2021). Entrepreneurial ecosystem and the quality and quantity of regional entrepreneurship: A configurational approach. *Journal of Business Research*, *128*(January), 499-509. https://doi.org/10.1016/j.jbusres.2021.02.015

Yang, J., & Zhang, M. (2021). The value of entrepreneurship and the entrepreneurial ecosystem: Evidence from 265 cities in China. *Growth and Change*, *52*(4), 2256-2271. https://doi.org/10.1111/grow.12543

Zhang, Y., & Roelfsema, H. (2020). Entrepreneurial Ecosystems, New Business Formation, and Scale-up Activity: Evidence from 286 Chinese Cities. *Entrepreneurship Research Journal*, 1-37. https://doi.org/10.1515/erj-2019-0265

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Acknowledgements and Financial Disclosure

I would like to express my gratitude to Dr. Éva Somogyiné Komlósi for her insightful guidance during the design phase. I am also grateful to the editors and reviewers for providing valuable comments on the earlier versions of this article.

Conflict of Interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Published by Krakow University of Economics – Krakow, Poland

Ministry of Education and Science
Republic of Poland

The journal is co-financed in the years 2022-2024 by the Ministry of Education and Science of the Republic of Poland in the framework of the ministerial programme “Development of Scientific Journals” (RCN) on the basis of contract no. RCN/SP/0583/2021/1 concluded on 13 October 2022 and being in force until 13 October 2024.

Entrepreneurial Business and Economics Review

2024, Vol. 12, No. 2

10.15678/EBER.2024.120210

Entrepreneurial values and circular economy adoption: A cross-lagged SEM-based machine learning study

Tahseen Anwer Arshi, Joseph Wallis

ABSTRACT

Objective: The objective of the article is to provide an entrepreneurial value-based perspective that can either drive or derail circular economy (CE) adoption and related strategies. The study argued that fundamental shifts toward CE adoption require a more profound value-based change.

Research Design & Methods: Existing studies have analysed several self-transcending values in advancing circular economy (CE). However, an adequate investigation is yet to occur on self-advancing values that can obstruct CE adoption and practice in an entrepreneurial context. Embedded within a norm activation model (NAM) and informed by value-belief-norm theory (VBN), the study builds on cross-lagged data (n=477) to explain the clash between dominant self-advancing entrepreneurial values and CE strategies.

Findings: The SEM-based machine-learning test results predicted that entrepreneurial hedonic and egoistic values complemented by hedonic and egoistic consumption reciprocally drive linearity rather than circularity within entrepreneurship. However, awareness of the consequences of adverse CE business models on society and the environment moderates the effect of self-enhancing values on CE strategies.

Implications & Recommendations: Policy instruments and macro-level societal intervention in creating, enhancing, and balancing self-transcendence values with self-advancing values can improve CE adoption across the entrepreneurial architecture.

Contribution & Value Added: The study is one of the first to demonstrate entrepreneurial value-oriented barriers to circularity, derailing CE diffusion to the broader entrepreneurial landscape. It suggests measures to enhance CE adoption among entrepreneurs.

Article type:	research article
Keywords:	circular economy; entrepreneurial values; sustainability; hedonic; egoistic; Structural equation modelling
JEL codes:	C12, C33, C45, C53

Received: 28 July 2023 Revised: 24 November 2023 Accepted: 11 December 2023

Suggested citation:
Arshi, T.A., & Wallis, J. (2024). Entrepreneurial values and circular economy adoption: A cross-lagged SEM-based machine learning study. *Entrepreneurial Business and Economics Review,* 12(2), 157-176. https://doi.org/10.15678/EBER.2024.120210

INTRODUCTION

The circular economy (CE) is emerging as a guiding principle for industrial and environmental policies (Corvellec *et al*., 2021; Völker *et al*., 2020). It is defined as 'a regenerative system in which resource input, waste, emission, and energy leakage are minimized by slowing, closing, and narrowing material and energy loops thanks to long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling' (Geissdoerfer *et al*., 2017, p. 759). The CE strategies involve two broad dimensions. The first relates to slowing and closing resource loops and slowing down the flow of resources and waste and making them assets for re-production. The second CE strategy involves improving the economy, environment, and society by redesigning processes and outputs through planning, resourcing, procurement, production, and reprocessing (Kirchherr *et al*., 2023). Researchers have extensively studied the role of self-transcending values, such as biospheric and altruistic values, in embracing CE

strategies (Gomes *et al*., 2022; Inigo & Blok, 2019) but have not paid adequate attention to the self-advancing values that can obstruct CE adoption. Schwartz (1992, p. 21) defined values as 'desirable trans-situational goals varying in importance, which serve as a guiding principle in the life of a person or social entity.' Deep-rooted changes in various stakeholders' industrial and business practices will only be successful once they are value-driven.

One of the significant stakeholders in the production and economic activity without which CE may not see its complete market evolution is entrepreneurs (Panait *et al*., 2022). Entrepreneurial venturing is a critical driver of economic and social growth, and hence entrepreneurs must transition to sustainable development, embracing circularity values to bolster circular economy efforts (Salvioni *et al*., 2022; Rovanto & Finne, 2023). Entrepreneurs powered by innovation can develop circular business models, creating a framework of circular entrepreneurship (Panait *et al*., 2022). Therefore, circularity within entrepreneurship is possible when more significant economic and societal norms of a production-consumption-reuse mindset are infused with personal entrepreneurial values (Foroozanfar *et al.,* 2022).

Contrastingly, economically driven entrepreneurial values associated with entrepreneurial venturing can also derail the aspirations of a circular economy. Entrepreneurs struggle to find the motivation to abandon well-functioning value chains over waste-focused and cost-enhancing supply chain systems (Katinka *et al*., 2023; Johansson & Krook, 2021). The opportunity exploitation mindset can lead to the depletion of natural resources, accumulation of industrial wastes, and environmental harm. These entrepreneurial values inspired by exploitative and economically oriented business models struggle to align with environmental wellness diffused from broader societal values (Rovanto & Finne, 2023; Salvioni *et al*., 2022; Inigo & Blok, 2019). Entrepreneurial business models have traditionally evolved through neo-classical and conventional economics, exploiting the efficiency of markets and, therefore, the values associated with a free-market capitalist economy continue to guide entrepreneurial values (Corvellec, 2020). Krajnc *et al*. (2022) argued that the end users are also critical in creating demand for sustainable production, but generally, they lack systematic thinking of reason, evaluation, and connection to create new solutions for CE as they are unaware of or lack training. There is little support from consumers as the existing research does not conclusively determine that consumer values have shifted towards circular offerings, and they are willing to engage in altruistic buying behaviour (Ali & Choe, 2022). Hence, entrepreneurial business models would not become fully circular until end-users accept circularity values, influencing entrepreneurial values.

Circular business models characterized by responsible production, consumption, and waste management enjoy less credibility than financially viable ones. A financially viable business model is validated with initial sales of goods and services, while circular business models gain credibility after recirculated products can generate equally attractive revenues for investors (Linder & Williander, 2017). As a result, the circularity strategies contradict economic supply and demand paradigms creating obstacles in fostering CE values (Johansson & Krook, 2021). Further, circular business models have entry barriers due to technical expertise, technological access, high capital investment, higher costs of production, lack of appropriate regulatory frameworks, and weak institutional support, all of which create obstacles to entrepreneurial venturing and put circularity on the back burner. Hence, to integrate the value of circularity with entrepreneurial business models, not only should the process be practical, it should become a value-driven decision, which may require some sacrifices for economic gains (Brandão *et al*., 2021). We found no research analyses the entrepreneurial value perspective as an enabler or obstacle to circular entrepreneurship. Addressing this research gap, this study highlights how economically driven entrepreneurial values, particularly in resource-constrained and resource-intensive industries, collide with circularity principles. The study discussed how possible trade-offs favouring sustainability over profitability can be addressed, by fostering circularity values and improving the awareness of the negative consequences of purely economic gains.

Several industries and sectors are typically characterized to obstruct the adoption and integration of circularity principles. For example, the production systems in heavy industries require high temperatures and fossil fuel combustion, impacting carbon emissions (Sutherland, 2020). Low-carbon heating methods are expensive and entrepreneurs generally are reluctant to adopt such costly innovative approaches. Similarly, in the linear path, several agricultural production resources, such as fertilizers,

pesticides, surface water, and soil, cannot be reused, putting pressure on the world's resources (Basso *et al*., 2021). Therefore, this study points towards several linear and economic-compulsion-driven businesses that hinder the integration of circularity principles in their business models. Accordingly, the analysis required purposive sampling through which samples were selected from industries and sectors that needed to highlight the economic compulsions of entrepreneurs in select industries.

Theoretical Background

We posited that weak theoretical anchoring of value-driven circularity in an entrepreneurial context has obstructed CE's conceptual development. Tian and Liu (2022) found that most of the theoretical developments and integrations on CE have taken place in the context of larger organizations. Zioło *et al*. (2023) reported that the contradictions related to environmental and financial performance have not been resolved and the findings remain inconclusive. The current theories underpinning circular values, such as corporate social responsibility, stakeholder theory, corporate sustainability, and green economics, have not matured to integrate entrepreneurial values (Chang *et al*., 2017). One of the most widely cited social-psychological frameworks to study circularity behaviours, namely the norm activation model (NAM), initially developed by Schwartz (1977), can help explain the complexities associated with CE values in an entrepreneurial context. The NAM determines the antecedents of human intentions and selfless behaviour toward the well-being of society and the environment (Savari *et al*., 2023). According to the NAM, personal norm (PN) towards pro-societal and pro-environmental human behaviours are activated as a result of awareness of consequences (AC), which leads to the acknowledgement of responsibility (AR) (Staats & Wilke, 2007). However, NAM presents a linear relationship between awareness of consequences, ascribed responsibility, and personal norms leading to behavioural intentions. Further, The NAM model focuses on AC related to environmental benefits but does not consider awareness of the consequences towards CE adoption risks and a negative evaluation as a result of AC (He & Zhan, 2018). For example, in an entrepreneurial context, AC about the higher costs of adopting CE practices and associated risks can reciprocally and negatively influence PN, leading to unacceptability of responsibilities. Heller and Vatn (2019) argued that in such situations external economic consideration dominates over internal value norms.

Therefore, there is an under-theorization of how self-enhancing values obstruct CE adoption and practices. Most of the psychological, social, and behavioural theories underrate the financial criteria in environmental adoption decision-making (Tian & Liu, 2022). The study posited that in an entrepreneurial context where most small firms struggle to survive, externally oriented economic consequences of CE adoption drive internally-driven PN, which decreases the chances of accepting CE responsibilities. However, AC characterized by a cognitive and emotional inclination towards circular values can mitigate the lopsided behaviour to prioritize economic values over CE values (Rees *et al*., 2015).

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

The extant literature is yet to be enriched with the knowledge and research on sustainable and circular entrepreneurial business models that effectively integrate CE principles in entirety rather than a few activities of its operations (Henry *et al*., 2020). The individual norms in the NAM are treated uniformly without shedding light on the variance of individual values supporting or negating environmental behaviours across cultures and business contexts (Oh & Ki, 2023; Cheng *et al*., 2022). The value perspective is critical in understanding these variances, which can explain whether pro-environmental behaviours can withstand the pressures of unsupportive values. To explain these variances, Stern (1999) extended NAM to the value-belief-norm theory (VBN). The VBN theory, found credible in various cultures, brings three aspects to light: egoism, altruism, and ecological value in pro-environmental behaviours. Testing self-enhancement values, such as egoism and hedonic values, can be ideal for examining motivations and behaviours related to the complex environmental, economic, and social dimensions associated with CE (Temesgen *et al*., 2021).

A critical question is whether entrepreneurial values coupled with business and context-driven imperatives influence CE adoption or hinder embracing CE strategies. In cases, where it encourages CE

adoption, the dominant values of the larger social and economic equality goal motivate personal and societal norms and acceptance of CE ideals (Mansilla-Obando *et al*., 2022). However, the extant literature and policy instruments throw very little light on how entrepreneurial businesses that struggle with resource requirements can embrace risks associated with CE adoption (Kębłowski *et al*., 2020). Explaining this dilemma, Niskanen *et al*. (2020) argued that resource-constrained entrepreneurs will likely embrace CE when they gain more control over resources and benefit from waste which becomes a resource in CE. Further, Khan *et al*. (2021) argued that CE-compliant entrepreneurial businesses benefit from re-branding, positioning themselves from dirty waste-producing firms to clean resource-producing ventures. This new environmental value position and innovation built around environmental improvement across the value chain, is reflected in the entrepreneurial business models (Dantas *et al*., 2022). The vital inquiry into whether entrepreneurship will be an enabler or hurdle for CE lies in the ability of CE to propose clear pathways for equity and social inclusion, shits in norms, lifestyles, culture, personal, social, and organizational values (Bianchini *et al.,* 2022; Salesa *et al*., 2022; Rovanto & Finne, 2023). According to Gomes *et al*. (2022), four values that determine personal norms and, ultimately, values related to circular entrepreneurship are biospheric, altruistic, egoistic, and hedonic. Biospheric values relate to care for nature and the environment, while altruistic values drive concern for human welfare. In contrast, egoistic values reflect care about power and wealth, and hedonic values characterize comfort and pleasure (Van der Werff & Steg, 2022).

Vuorio *et al*. (2018) found that hedonic values negatively relate to environmentally pertinent attitudes and behaviours. Hedonic values shape entrepreneurial behaviour and, ultimately, entrepreneurial business models (Ettis, 2022; Hendrik & de Jong, 2020). We found that due to dominant hedonic values, entrepreneurs are more likely to create business models that require minimum efforts and maximize benefits due to venturing risks and resource constraints. It is linked to entrepreneurial motivation of control and achievement traditionally associated with linear business models. Hedonic values also shape opportunism and profit-maximization behaviours related to supply, production design, and consumption (Yulistyawati *et al*., 2020).

Another probable reason entrepreneurs prefer linear business models is that they create hedonic experiences of feelings and emotions for customers, which improve the affective component in consumer purchase decisions. Hedonic consumption relates to pleasure, joy, and an emotional experience of satisfaction and superiority (Wei *et al*., 2023). Consumer purchase decisions become stronger when utilitarian values support hedonic values. According to Tarka *et al*. (2022), consumers feel a sense of positive energy when engaging in hedonic consumption. Hedonic values are like a double-edged sword, entrepreneurs will exploit that opportunity if consumers demand hedonic and affective-oriented consumption and will derail circular entrepreneurship goals. In their study, Andersch *et al*. (2019) found gaps in consumers' attitudes toward ethical products and actual buying behaviour. The connection between hedonic production and consumption is further explained by Yasir *et al*. (2021), who argued that entrepreneurs with robust hedonic goals would not engage in circularity behaviours until they see a personal gain, which seems highly unlikely in the face of business models aimed at gratifying consumption of their goods or services (Andersch *et al*., 2019; Prakash *et al*., 2019). Based on the discussion in the literature, we formulated the following research hypotheses.

H1: Dominant entrepreneurial hedonic values negatively influence the adoption of CE strategies.

H2: Hedonic values will significantly and negatively impact the adoption of CE strategies when demand for hedonic consumption is high.

Egoism can be defined as a motivational state targeting personal benefit as the ultimate goal (Batson *et al*., 1987). Unlike social entrepreneurs, commercial entrepreneurs are driven by personal gain (Ruskin *et al*., 2016). Furthermore, the essential motivation of entrepreneurial venturing and risk-taking is to maximize profit and exploit opportunities, which led Kirby *et al*. (2022) to conclude that entrepreneurs have not met the challenges of sustainable production and consumption. Egoistic values among entrepreneurs relate to costs and benefits, power or achievement, seeking self-rewards, and avoiding unpleasant emotions (Bouman *et al*., 2018).

Research evidence shows that egoistic values also drive consumption practices. Consumers are likely to purchase CE-inspired products when they see tangible benefits, such as food products that create health benefits (Wei *et al*., 2022; Septiani *et al*., 2020). Kumar and Pandey (2023) explained that egoistic consumption is evident primarily in health and food-related sectors, and more research is needed to support the value's effect across different sectors. Singh *et al*. (2023) found that consumers focus on egoistic product attributes first, analyzing if self-serving motives are fulfilled, followed by altruistic behaviour. Therefore, dominant egoistic values will dominate consumer purchase decisions over weaker altruistic values. As a result, egoistic purchase motives will drive entrepreneurial business models as they seek to maximize the opportunity. Thus, we formulated the following research hypotheses.

H3: Dominant entrepreneurial egoist values negatively influence the adoption of CE strategies.

H4: Egoistic values will have a significant negative impact on the adoption of CE strategies when the demand for egoistic consumption is high.

The effect of the dominant entrepreneurial hedonic and egoist values can be balanced with biospheric and altruistic values by increasing the awareness of the consequences of self-advancement behaviours (Gkargkavouzi *et al*., 2019). The awareness of consequences, a central construct in the VBN theory, actuates personal norms since entrepreneurs become aware of the negative consequences of their venturing activities (Savari *et al*., 2023). Previous studies have found that AC has been negatively correlated with self-enhancement value orientations because individuals pay attention to the information congruent with their value orientation (Hansla *et al*., 2008). Therefore, the dominant value orientation of self-advancement will likely remain the same despite being exposed to AC. Bouman *et al*. (2018) argued that information that enhances the awareness of consequences, particularly enhancing an emotional affiliation towards pro-environmental behaviours can moderate the effects of entrepreneurial values on adverse CE behaviours (Rees *et al*., 2015). This moderation may be more effective when demonstrating the personal benefits of altruistic or biospheric venturing or purchase decisions. Since a direct causal effect between AC and a change in value orientation may not be possible, the study posits that AC can only moderate the effect of self-enhancing values on CE strategies. Thus, we formulated the following hypothesis.

H5: Awareness of consequences moderates the relationship between self-enhancing values and the adoption of circular economy strategies.

RESEARCH METHODOLOGY

This deductive study is epistemologically constructed on a positivist philosophy and an objectivist ontology since the objective was to examine a statistically significant relationship between entrepreneurially dominant values and CE strategies (Bhasin, 2020). Therefore, we collected the data was collected through a self-reporting questionnaire with minimum probing. We designed all items in the questionnaire based on a Likert-style 5-point scale, which we administered online.

Sample Selection

The study's sampling frame were entrepreneurs in three countries, namely India, Oman, and the United Arab Emirates. We drew the list of entrepreneurs from the Chambers of Commerce and Industries in these countries. The study utilized purposeful sampling in selecting participants for the study. The inclusion criteria included only those entrepreneurs who ticked an initial question on the top of the questionnaire, which read: I agree that I give preference to my venture's profitability strategies over circularity strategies. We collected the data at two different time intervals with a gap of six months between November 2022 (T1) (n=477) and May 2023 (T2) (n=475). We collected the second wave of data from the same sample to check the robustness of the values and participants' resolve in their values. The data collection involved an experimental treatment as the participants were sent additional information on the benefits of CE and the adverse effects of the linear business models on society and the environment.

Measures

The study assessed the entrepreneurial hedonic values through the Hedonic and Eudemonics Motives for Activities (HEMA) scale developed by Huta and Ryan (2010) and further refined by Asano *et al*. (2018) and Braaten *et al*. (2019). Similarly, the study applied the hedonic consumer value (HCV) scale developed by Tarka (2015) and further modified by Picot-Coupey *et al*. (2021) to examine entrepreneurial compulsion in designing consumer products and services with hedonic treatment at the expense of CE values. Further, the study adopted the egoistic value scale for entrepreneurs and consumers through portrait value questionnaire (PVQ) (Schwartz, 2014) and Wang *et al.* (2018). Finally, we measured AC through the awareness of consequences scale developed by Hansla *et al*. (2008) and Osburg *et al*. (2019). The literature indicated that CE is substantially broad in scope, and several indicators are used to measure CE strategies (Iacovidou *et al*., 2017). We measured the CE strategies through two broad approaches: *sensu stricto,* which involved slowing down and closing the lop strategies, and *sensu latu*, focusing on procurement, production, and reprocessing strategies broadly influencing the economy, society, and the environment (Moraga *et al*., 2019).

Analytical Procedure and Data Analysis

We analysed the longitudinal data using cross-lagged path models testing the causal, reversed, causal and reciprocal effects between the entrepreneurial values and CE strategies. We tested four competing models to examine the temporal relationship between entrepreneurial value types and CE-related decisions (Figure 1).

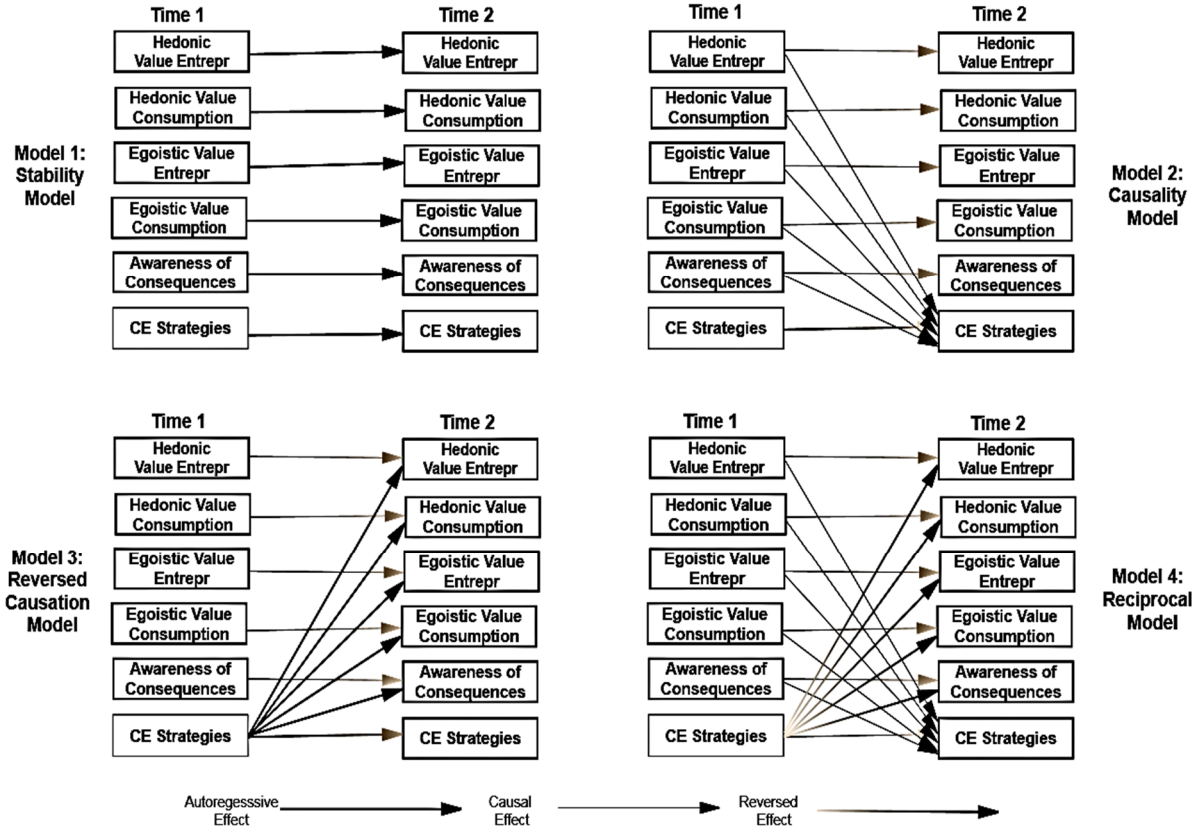

Figure 1. Four competing models

Source: own elaboration of empirical research.

Model 1 examined entrepreneurial value's stability over time. A high autoregressive coefficient would indicate minimized changes over time and reduced estimation bias (Selig & Little, 2012). Model 2 assessed the causal effects between entrepreneurial values and CE strategies. Model 3,

with autoregressive results, tested the reversed causal impact, while model 4 analysed if the entrepreneurial value and CE values reciprocally impacted each other. In this model, we combined the causality and reversed causation effects.

Further, the study performed the structural equation modelling (SEM) tests utilizing IBM SPSS (AMOS version 22) to investigate the theoretical model's fit with the statistical default model. Due to the confirmatory approach, the study employed a co-variance-based SEM to test the hypothesized models, as suggested by Hair *et al*. (2019). Finally, the complete SEM model explored the role of awareness of consequences in moderating the adverse effects of dominant entrepreneurial values on CE strategies.

RESULTS AND DISCUSSION

We checked the data for reliability and internal consistency of measures, and a Cronbach score > 0.7 showed that the data were reliable for further analysis. Next, the study analysed correlations between the variables through Pearson's correlation test. Table 1 shows the correlation matrix indicating that constructs correlated with time 1 and 2 data. Circular economy strategies were significantly and negatively correlated with hedonic and egoistic values of entrepreneurs and consumers (r= -0.587), (r=-0.574), (r= -0.318), and (r= -0.377). However, the CES was positively correlated with awareness of consequences (r= 0.269).

Table 1. Mean, standard deviation, and Pearson correlations matrix

Variable	Time	Mean	Std. Dev	HNVE	HNVC	EGVE	EGVC	AWCS
HNVE	T1	3.916	0.611	–	–	–	–	–
	T2	4.113	0.566	–	–	–	–	–
HNVC	T1	4.063	0.525	0.228**	–	–	–	–
	T2	4.127	0.571	0.294**	–	–	–	–
EGVE	T1	3.987	0.515	0.549***	0.232*	–	–	–
	T2	4.001	0.634	0.517***	0.217*	–	–	–
EGVC	T1	4.061	0.647	0.287**	0.258**	0.429**	–	–
	T2	3.960	6.024	0.299**	0.304**	0397**	–	–
AWCS	T1	4.082	0.599	0.313**	0.357**	0.382**	0.312**	–
	T2	4.043	0.597	0.319**	0.324**	0.391**	0.327**	–
CENS	T1	4.071	0.668	-0.510***	-0.515***	-0.375**	-0.352**	0.267**
	T2	4.022	0.622	-0.587***	-0.574***	-0.318**	-0.377**	0.269**

*Note: N = 477 *Significant at 0.05 level, **Significant at the 0.01 level, ***Significant at 0.001 level. Hedonic value entrepreneurs=HNVE, hedonic value consumers=HNVC, egoist values entrepreneurs= EGVE, egoist values consumers= EGVC, awareness of consequence's = AWCS, and circular economy strategies=TI.*
Source: own study.

We tested for multicollinearity effects considering high correlation values, but no evidence of multicollinearity was found as the variance inflationary factor test (VIF) scores were > 0.2 (Tabachnik & Fidell, 2007). Since the data came from three different research settings, we tested for homogeneity of variance, but Leven's static test showing a score of >0.05 and thus indicated no evidence of heteroscedastic data.

SEM: Measurement and Structural Models

The study used structural equation modelling (SEM) as a robust statistical test to draw conclusions about the hypothesized relationships and test the multivariate causal relationships with direct and indirect effects. Firstly, the study developed a measurement model (MM) to examine the relationship between latent variables and their indicators and validate the theoretical structure, as Fan *et al.* (2016) suggested. The measurement items correlated across time during the test, while the intercepts were equal per the measurement invariance. The measurement items showed satisfactory reliability (Cronbach's α 0.74-0.88), and the factor loadings in the MM were > 0.60 ($p < 0.001$), indicating good convergent validity. Subsequently, the structural model was developed to test the hypothesized relationship over time across the competing SEM models (Tabachnik & Fidell, 2007). The causal model

assumed a multivariate normal distribution utilizing the maximum likelihood method, and the relationship between endogenous and exogenous variables was considered linear. While examining structural model validity, the fit indices were acceptable benchmarked against standards set by Hu and Bentler (1999) ($\chi 2$ (215) = 311.03, $p < 0.01$; CFI = 0.968; TLI = 0.965; RMSEA = 0.040). Table 2 shows the factor scores, alpha, and average variance extracted (AVE). Since the AVE scores on factors were < 0.05, the data indicated a satisfactory level of discriminatory validity.

Table 2. Factor loadings, alpha, and average variance extracted values

Variables and their scale items	Factor Score	Alpha (KMO)	AVE
Hedonic values entrepreneurs		0.72 (0.77)	0.4113
1. I would like to venture into areas that are easier to market	0.72		
2. I want to feel less stressed with my business	0.71		
3. A linear business model gives me better control	0.74		
4. Venturing into areas of my interest gives me pleasure	0.69		
5. High profitability provides me with a sense of achievement	0.71		
Hedonic Values Consumption		0.74 (0.75)	0.4387
1. My target customers strive for new experiences	0.74		
2. Guilt-free consumption is an enjoyable experience for my customers	0.70		
3. My target customers care for themselves	0.74		
4. My target customers seek exciting life	0.75		
5. My target customers strive to achieve success in life	0.68		
Egoistic Values Entrepreneurs		0.75 (0.77)	0.4329
1. I prefer to keep my job rather than enhance environmental wellness	0.73		
2. Values associated with CE can obstruct my wealth creation	0.74		
3. Values associated with CE can threaten my control of the supply chain	0.77		
4. Values associated with CE can threaten my social network	0.75		
Egoistic Values Consumption		0.72 (0.74)	0.4134
1. My target customers will not easily accept eco-friendly products	0.68		
2. My target customers are focused on their well-being	0.73		
3. My target customer's receptiveness to CE values may depend on the information they are exposed to	0.70		
4. My target customers may accept eco-friendly products when they can see tangible benefits for themselves	0.73		
Awareness of Consequences		0.73 (0.72)	0.4994
1. Complete pro-environmental awareness may promote my firm's adopting CE values.	0.74		
2. If I have a feeling of environmental affection, it may lead to my firm adopting CE practices.	0.77		
3. Information related to the awareness of consequences to the biosphere may promote the adoption of CE values.	0.75		
Circular Economy Strategies		0.79 (0.78)	0.4223
1. I am conserving the function of products or services designed through circular business models.	0.78		
2. I extend the product through lifetime through durability, reuse, restoration, refurbishment, and remanufacturing strategies.	0.75		
3. I protect the product's components by reusing, recovering, and repurposing parts.	0.80		
4. I am preserving the materials through recycling and downcycling strategies.	0.81		

Note: Figures in parenthesis are KMO scores.
Source: own study.

Examining and Predicting Causality

The study further constructed the path analysis to quantify the relationships between multiple variables. The causal and mediation effects were tested through four competing cross-legged models assessing possible causal, reverse causal, and reciprocal relationships, as suggested by Hair *et al*. (2019).

The data indicated a good model fit, indicating low measurement errors and demonstrating that the data fitted the theoretical model well. Figure 2 and Table 3 illustrate that the value constructs were stable over time, considering the significant autoregressive effects. Among the competing models, the causality model showed the best model fit (Δχ2 = -42.87, p < 0.001), followed by the reciprocal model (Δχ2 = 24.79, p < 0.01), and the reversed model (Δχ2 = -18.54 (p < 0.05).

Table 3. Model comparison

No.	Model	χ^2	df	CFI	TLI	RMSEA	Model comparison	$\Delta\chi^2$	δ
1	Stability model	24.41	11	0.994	0.0967	0.026	–	–	–
2	Causality model	25.42	8	0.992	0.988	0.044	1 vs 2	-42.87***	3
3	Reversed model	19.83	8	0.983	0.956	0.049	1 vs 3	18.54*	3
4	Reciprocal model	6.18	6	1.000	1.000	0.000	1 vs 4	24.79**	6
–							2 vs 3	-7.31	1
							2 vs 4	8.46	3
							3 vs 4	12.77*	3

Note: N = 477*, *p* < 0.05*, **p* < 0.01*, ***p* < 0.001*.*
Source: own study.

Hypothesis 1, which posited that dominant hedonic values negatively influence CE strategies, was supported by the results (-42.87*, p* < 0.001*) as HNVE* had a significant negative lagging effect on CE strategies. Moreover, HNVE at Time 1 significantly negatively impacted the change of CE strategies from T1 and T2 (Table 4) (*Model 2: γ =* -0.74). Likewise, hypothesis 2 was supported as the effect of hedonic values related to consumption had a lagged impact on CE strategies (*Model 2: γ =* -0.64). Table 4 shows the results.

Table 4. Parameter estimates of the path models

Variables	Model 2: Causality model		Model 5: Moderation model	
	γ	SE	γ	SE
Autoregressive effects				
Hedonic values of entrepreneurs	0.65**	0.04	0.70**	0.03
Hedonic consumption demands	0.61**	0.03	0.76**	0.02
Egoistic values of entrepreneurs	0.77***	0.01	0.69**	0.01
Egoistic consumption demands	0.71***	0.01	0.59**	0.03
Awareness of consequences	0.47**	0.05	0.64**	0.05
Circular economy strategies	0.66**	0.05	0.61**	0.05
Predicting turnover intention (T2)				
Hedonic values of entrepreneurs (T1)	-0.74***	0.02	0.69***	0.04
Hedonic consumption demands (T1)	-0.64**	0.03	0.72***	0.03
Egoistic values of entrepreneurs (T1)	-0.71***	0.02	0.75***	0.02
Egoistic consumption demands (T1)	-0.68***	0.04	0.70***	0.04
Awareness of consequences (T1)	0.42**	0.05	0.42**	0.05
Circular Economy Strategies (T1) Hedonic values x AWCS (T1)	–	–	0.66*** 0.39**	0.04
Hedonic consumption x AWCS (T1)	–	–	0.32**	0.04
Egoistic values x AWCS (T1)	–	–	0.40**	0.03
Egoistic consumption x AWCS (T1)	–	–	0.39**	0.05

Note: N = 475*, *p* < 0.05*, **p* < 0.01*, ***p* < 0.001*.*
Source: own study.

The egoistic values of entrepreneurs and demand for egoistic consumption also negatively impacted CE strategies, and therefore the results supported hypotheses 3 and 4. Egoistic values of entrepreneurs showed a lagged impact on the change of CE strategies over time (*Model* 2*: γ =* -0.71) and demand for

egoistic consumption (*Model* 2*: γ* = -0.68). Finally, awareness of consequences did show a moderate effect on CE strategies. AWCS moderated the adverse effects of hedonic and egoistic values on CE strategies design and implementation as it positively impacted CE strategies (*Model* 2*: γ* = 0.42). The findings imply that the chances of developing CE strategies are high when awareness of consequences is high.

Predicting Moderating Effect

Hypothesis 5 anticipated the differential moderating effect of AWCS on CE strategies (Model 5). The study multiplied the z-standardized variables measures at T1 and added the interaction terms to calculate the HNVE, HNVC, EGVE, and AWCS scores. The results in Table 4 show that AWCS moderated the hedonic and egoistic value's adverse effect on CE strategies. Therefore, hypothesis 5 was supported as the interaction of AWCS was positively related to the change of CE strategies over time-AWCS and hedonic values of entrepreneurs (*Model 5: γ* = 0.39*, p* < 0.01*);* ACWS and hedonic consumption (*Model* 5*: γ* = 0.32*, p* < 0.01*);* AWCS and egoistic value of entrepreneurs (*Model* 5*: γ* = 0.40*, p* < 0.01*).* and AWCS and egoistic consumption (*Model 5: γ* = 0.39*, p* < 0.01*(Table* 4*, Figure* 2*).*

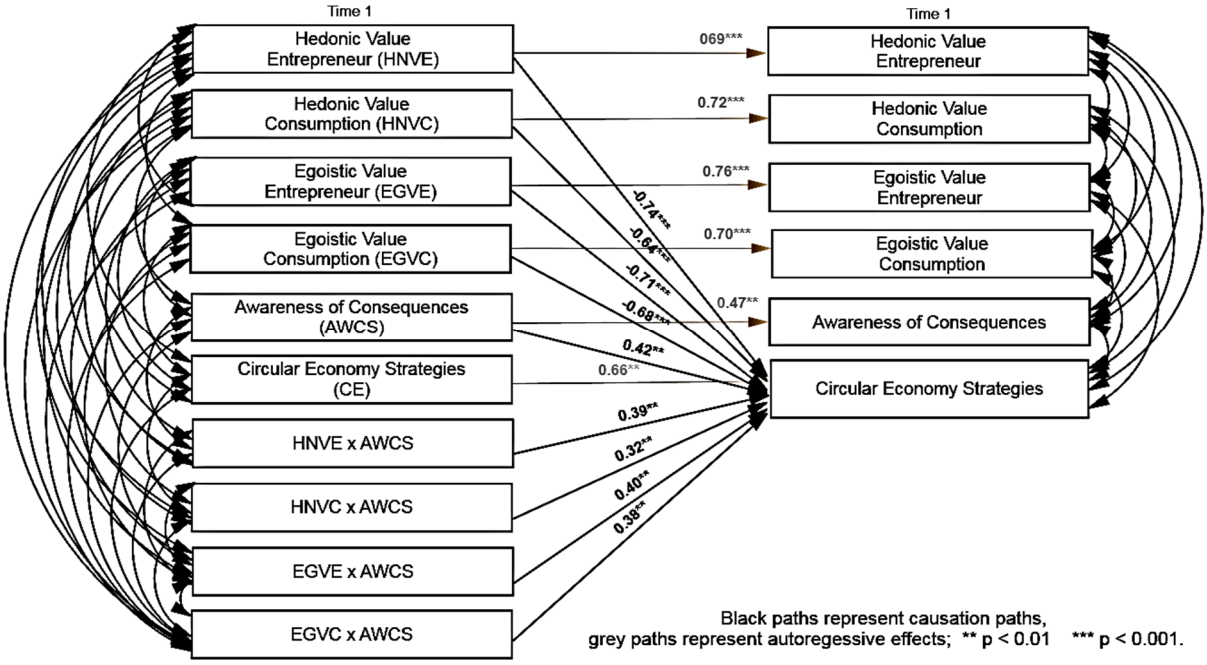

Figure 2. Moderation model
Source: own elaboration of empirical research.

Finally, we tested the complete structural model through the equation $\eta = B\eta + \Gamma\xi + \varsigma$ to examine the combined effect of hedonic and egoistic values on CE strategies.

The results of the complete SEM analysis in Figure 3 show that all the hypotheses are well-supported. The coefficient values of HNVE (0.61, p <.001) HNVC, (0.72 p <.001), EGVE (0.59 p <.001), and EGVC (0.48 p <.001) indicated a significant effect of these entrepreneurial values on CE strategies over time. The fit indices were above the recommended benchmarks (CFI = 0.990; GFI= 0.989, AGFI, 0.972, TLI = 0.988; RMSEA = 0.043).

Robustness and machine learning tests: Generalization

The study conducted machine learning cross-validation tests to predict the accuracy of the SEM results. The performance analysis test showed the predictive accuracy of entrepreneurial value's effect on CE strategies. We utilized the T1 data (n=477) as the training dataset, and for the validation dataset, T2 data (n=475) as suggested by Rashidi *et al*. (2023). Then, we subsequently conducted sensitivity and specificity tests, and analysed the resultant receiver operator characteristic (ROC) and area under the curve (AUC) graphs (Gareth, 2013). We examined the predictive distribution models' s through the

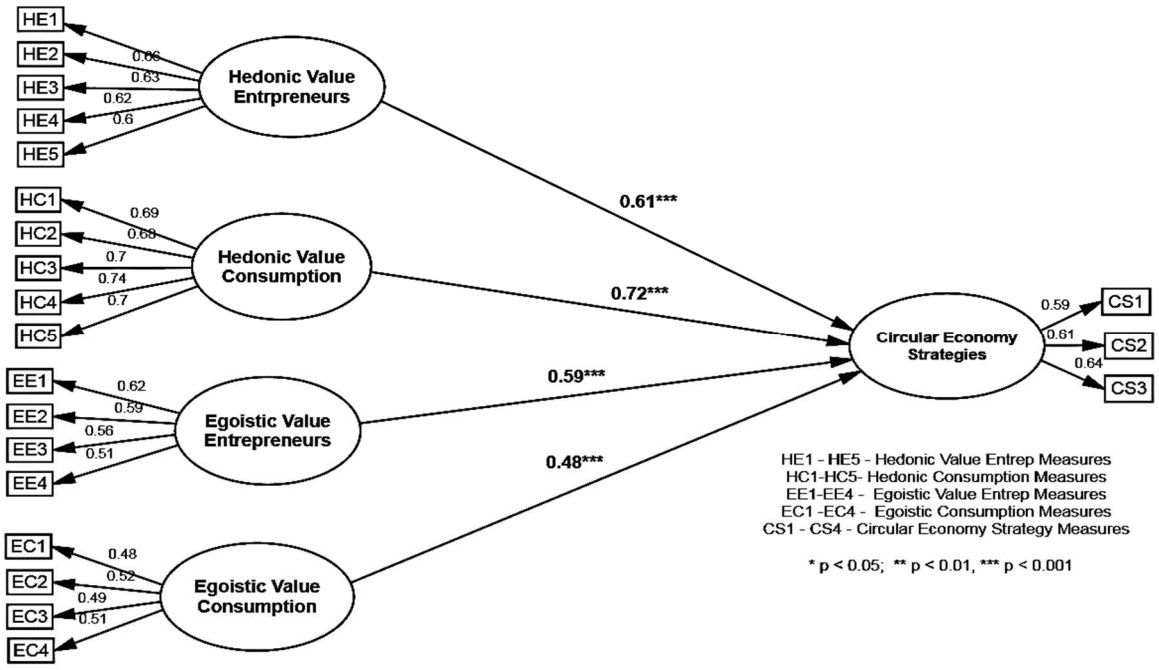

Figure 3. Default SEM model
Source: own elaboration of empirical research.

ROC. The positive rate (sensitivity) on the y-axis showed the sample's correct classification, while the x-axis indicating the false positive rate (1-specificity), showed incorrect classifications, if any. The F1 score (PRE score range 1.0 to 0.0 from excellent to poor) and recall (REC score range 1.0 to 0.0 from excellent to poor) balanced precision and recall. We utilized the following equation to calculate F1.

$$F1 = 2 \cdot (\mathrm{PRE} \cdot \mathrm{REC})/(\mathrm{PRE} + \mathrm{REC}) \quad (1)$$

Figure 4 and Table 5 demonstrate the SEM model's predictive accuracy in showing entrepreneurial value's effect on CE strategies. The model's accuracy in predicting each of the CE strategies was valid (HE-CE *0.967* algorithm-gradient boosting classifier, Figure 4a), HC-CE (*0.976* algorithm-decision tree classifier, Figure 4b), EE-CE (*0.931* algorithm-decision tree classifier. Figure 4c) and EC-CE (*0.928* algorithm-decision tree classifier, Figure 4d). Overall, the model accurately predicts entrepreneurial value's impact on CE strategies as the thresholds are appropriate (Tran *et al*., 2020) (Figure 4e).

Table 5. Parameter estimates of values-CE strategies model

Decision tree classifier	CE Strategies	
	Macro-precision	Cross-validation
Macro-precision	0.993	0.967
Accuracy	0.976	0.976
Macro-recall	0.971	0.931
Weighted precision	0.976	0.928
Macro F_1 Measure	0.981	0.971
Weighted F_1 Measure	0975	0.990
Weighted recall	0.976	0.989

Note: AUC range = 0 to 1. A model with predictions that are 100% wrong will have an AUC of 0.0, and a model with predictions that are 100% correct will have an AUC of 1.0.
Source: own study of empirical research.

Table 5 shows that cross-validation scores support F1 micro-precision scores and that the training and test datasets are coherent.

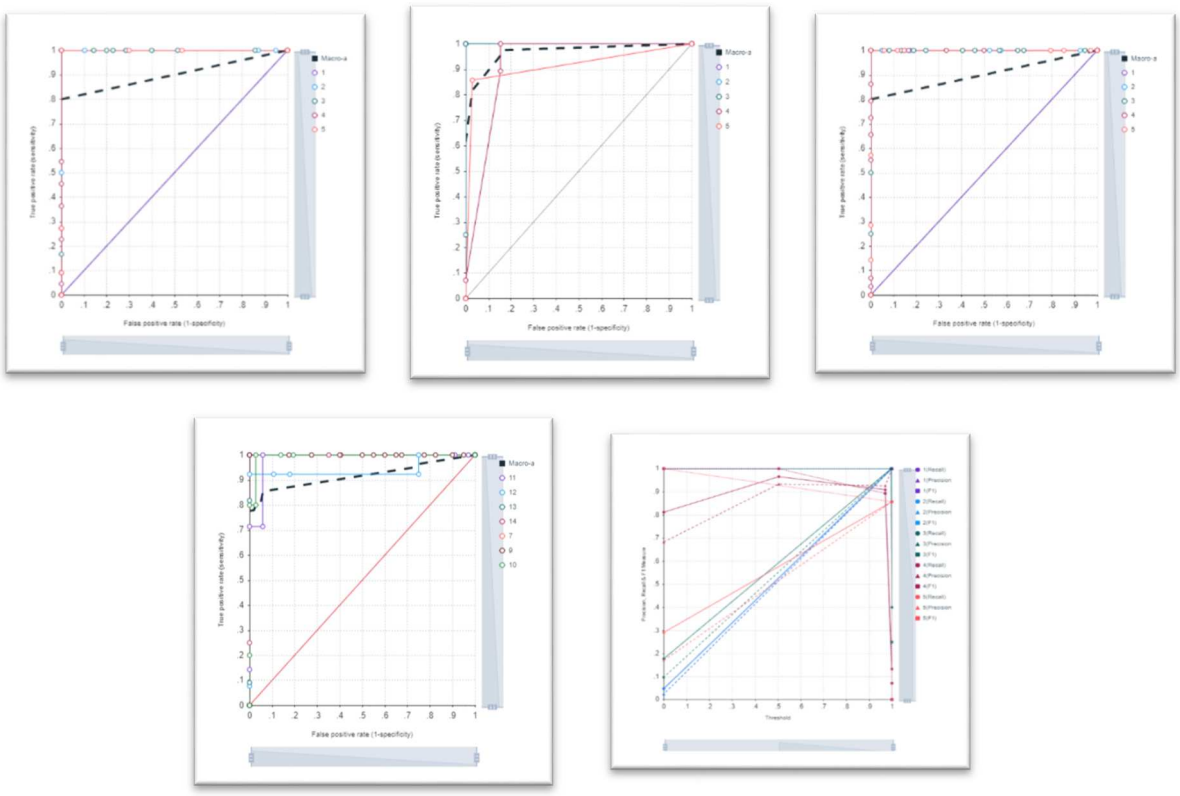

Figure 4. (a-e): ROC and AUC graphs predicting the probability of the impact of each entrepreneurial value on CE strategies
Source: own elaboration of empirical research.

Discussion and Implications

The study contributes to understanding of the deep-rooted entrepreneurial values that obstruct implementing CE strategies in an entrepreneurial context. The study argued that to disrupt and overturn well-established linear business practices in favour of CE strategies requires fundamental shifts in value and belief systems. Entrepreneurs struggle to find the motivation to abandon well-functioning value chains over waste-focused and cost-enhancing supply chain systems (Katinka *et al*., 2023; Johansson & Krook, 2021). Therefore, the study combined insights from NAM and VBN theories to illuminate the value- perspective and illustrate how values are critical to the adoption of CE strategies. Further, the study utilizing the goal framing theory related to hedonic and egoistic values demonstrates how these values influence the personal norms of entrepreneurs and consumers (Ryff, 2019). The study found that entrepreneurial values inspired by the free-market capitalist economy, which promotes hedonic and egoist consumption, conflict with CE values obstructing the adoption of CE strategies. The study reinforces the findings of Ettis *et al*. (2022), who posited that hedonic values are a significant motivation for entrepreneurial venturing. Arshi *et al*. (2022) pointed out that entrepreneurial venturing is an opportunity-driven behaviour, and venturing is a risky and complicated endeavour. Therefore, entrepreneurs seek to keep it straightforward, minimize risks, have better control and feel less stressed (Arshi *et al*., 2021). In the face of tension between self-enhancing entrepreneurial values and the adoption of CE strategies, the entrepreneurial values bolstered by opportunity exploitation and financial gains are often the winner, with broader CE practices becoming a casualty. Therefore, when hedonic and egoistic values dominate certain entrepreneurs, they will likely derail CE dissemination and growth. However, the study found that situational activators towards economic values are more dominant in certain industries such as heavy industries, agricultural, and petroleum sectors. Therefore, in less-demanding industries other entrepreneurial values, such as altruism and biospheric values, support the adoption of CE values and strategies (Gomes *et al*., 2022).

Hedonic and egoistic values are not restricted to the entrepreneurs alone but infiltrate the business model they design and implement. The primary reason for the dominance of these hedonic and egoistic values in business models is primarily attributed to hedonic and egoistic demand and consumption patterns (Wei *et al*., 2023; Yasir *et al*., 2021). Entrepreneurial hedonic values are complemented by demands for hedonic consumption, which completes the circularity of hedonic orientation, ultimately obstructing pro-environmental values from emerging or becoming dominant. Egoistically oriented consumers seek self-gain benefits through egoistic consumption by not accepting premiums for eco-friendly products (Helmi *et al*., 2023). These consumers face a psychological conflict between hedonic, egoistic, altruistic, and biospheric consumption. The entrepreneurs utilize this opportunity, further driving hedonic and egoistic consumption. However, new CE models are emerging that embed economic gains without violating CE principles and attract consumers with diverse values.

A fundamental value shift is required to espouse circular values and strategies. This chain of circularity between demand and supply can be weakened through awareness of the consequences of hedonic and egoistic consumption in conjunction with promoting altruistic and biospheric values at the individual and societal levels (Zhang *et al*., 2020; Gkargkavouzi *et al*., 2019). The extant literature did not move beyond the linearity of these relationships in unsupportive environmental behaviours. This study addressed it by examining the reverse and reciprocal relationships and found a reciprocal effect of the adoption of CE strategies on entrepreneurial values. The reason for this is that the adoption of some CE-related activities raises the awareness of entrepreneurs and consumers toward the personal and societal gains associated with CE strategies.

Theoretical contributions

Previous studies utilizing NAM and VBN theories have mainly studied in the context of pro-environmental behaviours (Canlas *et al*., 2022). Contrastingly, this study embedded the NAM and VBN theories to analyse unsupportive environmental behaviours and provide insights into specific values obstructing the adoption of CE values and strategies. The study contributed to the combined NAM and VBN theories by showing that the relationship between awareness of consequences, the ascription of responsibility, and norms and values are only partially linear. It showed a reciprocal relationship between values and environmental behaviours. It identified that awareness of consequences moderated the relationship between values and unsupportive environmental behaviours. The awareness of consequences was mostly posited as having a positive impact on CE adoption. However, the study pointed out that AC towards risks associated with CE adoption may lead to negative evaluation and therefore the awareness component should enthuse knowledge and affection towards CE. The awareness of consequences should create a cognitive and affective stimulant which will have a stronger PN and acceptance of CE responsibilities. The findings imply that these relationships are not straightforward, and the presence or absence of awareness of consequences may not switch environmental behaviours as negative evaluations are possible. Instead, it is a complex relationship and awareness of consequences can either strengthen or weaken the relationship between values and environmental behaviours.

CONCLUSIONS

Drifting from the dominant research focus on the entrepreneurial role in engaging in pro-environmental behaviours and CE, this study focused on value barriers specific to business venturing that derail CE adoption and diffusion, particularly in the entrepreneurial community. The study concluded that hedonic and egoistic values obstruct the adoption of CE strategies at two levels. Firstly, entrepreneurs' hedonic and egoistic orientations hinder the adoption of CE strategies. Secondly, consumers' hedonic and egoistic consumption choices influence entrepreneurs to design linear business models. The compulsion for both the supply can demand linear venturing is driven by traditional entrepreneurial and consumer values. A sound strategy and system to improve the credibility and diffusion of information, creating environmental affection can influence AC which moderates the effect of such values on environmental behaviours and CE. Considering the critical role of values, the integration of financial and CE values in the new and emerging business models can resolve the majority of the dilemmas associated with CE adoption

and attract customers with diverse values. A value-based framework that takes a two-sided view of the integration of financial objectives and CE practices can help in further theory development.

Future Research and Limitations

The extant literature has yet to conclude who creates entrepreneurial and consumer awareness towards CE's benefits to the individual, environment, and society. Trautwein *et al*. (2023) and Legros and Cislaghi (2020) highlighted the importance of social norms that may directly or indirectly create social awareness but could not establish how can it diffuse to various stakeholders. Recent evidence has shown that policy instruments and macro-level efforts to create awareness have produced weak results, especially in an entrepreneurial context, and need further research attention.

Future research should further explore the interactivity of the relationship between NAM and VBN variables instead of treating them in linearity. Researchers can analyse how the information that enhances the awareness of consequences is generated, disseminated, and made more credible. Future research studies can develop recommendations on how to enrich awareness through cognitive and emotional appeal. When both dimensions stimulate personal normal acceptance of responsibility among entrepreneurs can be higher.

The study had a few limitations. The first limitation of the study is that the study could not analyse the exceptional conditions under which hedonic and egoistic values could be instrumental in promoting pro-environmental behaviours and promoting the development of CE. The study's second limitation is that it only included participants with a stronger orientation toward hedonic and egoistic values more prevalent in certain industries, thereby limiting the insights into possible nuanced inclinations and sporadic activities they might have had toward CE.

REFERENCES

Al Mamun, A., Hayat, N., Mohiuddin, M., Salameh, A.A., Ali, M.H., & Zainol, N.R. (2022). Modeling the significance of value-belief-norm theory in predicting workplace energy conservation behavior. *Frontiers in Energy Research, 10*, 940595. https://doi.org/10.3389/fenrg.2022.940595

Ali, M.I.M., & Choe, P. (2022). Independent User Circular Behaviors and Their Motivators and Barriers: A Review. *Sustainability*, *14*, 13319. https://doi.org/10.3390/su142013319

Andersch, H., Arnold, C., Seemann, A.K., & Lindenmeier, J. (2019). Understanding ethical purchasing behavior: Validation of an enhanced stage model of ethical behavior. *Journal of Retailing and Consumer Services*, *48*, 50-59. https://doi.org/10.1016/j.jretconser.2019.02.004

Arshi, T.A., Ambrin, A., Rao, V., Morande, S., & Gul, K. (2022). A Machine Learning Assisted Study Exploring Hormonal Influences on Entrepreneurial Opportunity Behaviour. *The Journal of Entrepreneurship, 31*(3), 575-602. https://doi.org/10.1177/09713557221136273

Arshi, T.A., Islam, S., & Gunupudi, N. (2021). Predicting the effect of entrepreneurial stressors and the resultant strain on entrepreneurial behavior: an SEM-based machine-learning approach. *International Journal of Entrepreneurial Behavior & Research*, *27*(7), 1819-1848. https://doi.org/10.1108/IJEBR-08-2020-0529

Asano, R., Tsukamoto, S., Igarashi, T., & Huta, V. (2018). Psychometric properties of hedonic and eudaimonic orientations measures in Japan: the HEMA scale. *Current Psychology*, *40*(1), https://doi.org/10.1007/s12144-018-9954-z

Basso, B., Jones, J.W., Antle, J., Martinez-Feria, R.A., & Verma, B. (2021). Enabling circularity in grain production systems with novel technologies and policies. *Agricultural Systems*, *193*, 103244, https://doi.org/10.1016/j.agsy.2021.103244

Batson, C.D., Dyck, J.L., Brandt, J.R., Batson, J.G., Powell, A.L., McMaster, M.R., & Griffitt, C. (1988). Five studies testing two new egoistic alternatives to the empathy-altruism hypothesis. *Journal of Personality and Social Psychology*, *55*(1), 52-77. https://doi.org/10.1037/0022-3514.55.1.52

Bouman, T., Steg, L., & Kiers, H.A.L. (2018). Measuring Values in Environmental Research: A Test of an Environmental Portrait Value Questionnaire. *Frontiers in Psychology*, *23*(9), 564. https://doi.org/10.3389/fpsyg.2018.00564

Bianchini, A., Guarnieri, P., & Rossi, J.A. (2022). Framework to Assess Social Indicators in a Circular Economy Perspective. *Sustainability*, *14*, 7970. https://doi.org/10.3390/su14137970

Brandão, A.S., Gonçalves, A., & Santos, José M.R.C.A. (2021). Circular bioeconomy strategies: From scientific research to commercially viable products. *Journal of Cleaner Production*, *295*, 126407, https://doi.org/10.1016/j.jclepro.2021.126407

Braaten, A., Huta, V., Tyrany, L., & Thompson, A. (2019). Hedonic and eudaimonic motives toward university studies: how they relate to each other and to well-being derived from school. *Journal of Positive Psychology and Well-being, 3*, 179-196.

Canlas, I.P., Karpudewan, M., & Mohamed Ali Khan, N.S. (2022). More Than Twenty Years of Value-Belief-Norm Theory of Environmentalism: What Has Been and Yet to Be Done?. *Interdisciplinary Journal of Environmental and Science Education*, *18*(2), e2269. https://doi.org/10.21601/ijese/11801

Chang, R-D., Zuo, J., Zhao, Z-Y., Zillante, G., Gan, X-L., & Soebarto, V. (2017). Evolving theories of sustainability and firms: History, future directions and implications for renewable energy research. *Renewable and Sustainable Energy Reviews*, *72*, 48-56. https://doi.org/10.1016/j.rser.2017.01.029

Corvellec, H., Stowell, A.F., & Johansson, N. (2022). Critiques of the circular economy. *Journal of Industrial Ecology*, *26*, 421-432. https://doi.org/10.1111/jiec.13187

Dantas, R.M., Ilyas, A., Martins, J.M., & Rita, J.X. (2022). Circular Entrepreneurship in Emerging Markets through the Lens of Sustainability. *Journal of Open Innovation: Technology, Market, and Complexity*, *8*(4), 211. https://doi.org/10.3390/joitmc8040211

Damaneh, H.E. *et al.* (2023). Integrating the norm activation model and theory of planned behavior to investigate farmer pro-environmental behavioral intention. *Science Reports, 13*, 5584 https://doi.org/10.1038/s41598-023-32831-x

Ettis, S.A. (2022). How do personal values help to build Generation Y's entrepreneurial intentions? The role of gender differences. *Gender in Management*, *37*(1), 108-125. https://doi.org/10.1108/GM-02-2021-0035

Fan, Y., Chen, J., & Shirkey, G. *et al.* (2016). Applications of structural equation modeling (SEM) in ecological studies: an updated review. *Ecological Process*, *5*(19), https://doi.org/10.1186/s13717-016-0063-3

Foroozanfar, M.H., Imanipour, N., & Sajadi, S.M. (2022). Integrating circular economy strategies and business models: a systematic literature review *Journal of Entrepreneurship in Emerging Economies*, *14*(5), 678-700. https://doi.org/10.1108/JEEE-10-2021-0411

Gareth, J., Witten, D., Hastie, T., & Tibshirani, R. (2013). *An Introduction to Statistical Learning: With Applications in Research*. New York: Springer, and New York, NY.

Genovese A., & Pansera, M. (2020). The circular economy at a crossroads: Technocratic eco-modernism or convivial technology for social revolution?. *Capitalism Nature Socialism*, 1-19. https://doi.org/10.1080/10455752.2020.1763414

Geissdoerfer, M., Savaget, P., Bocken, N.M.P., & Hultink, E.J. (2017). The circular economy: A new sustainability paradigm?. *Journal of Cleaner Production*, *143*, 757-768. https://doi.org/10.1016/j.jclepro.2016.12.048

Gkargkavouzi, A., Halkos, G., & Matsiori, S. (2019). Environmental behavior in a private-sphere context: Integrating theories of planned behavior and value belief norm, self-identity and habit. *Resources, Conservation and Recycling, 148*, 145-156. https://doi.org/10.1016/j.resconrec.2019.01.039

Gomes, G.M., Moreira, N., Bouman, T., Ometto, A.R., & Van der Werff, E. (2022). Towards Circular Economy for More Sustainable Apparel Consumption: Testing the Value-Belief-Norm Theory in Brazil and The Netherlands. *Sustainability* 2022, *14*, 618. https://doi.org/10.3390/su14020618

Hair, J.F., Black, W.C., Babin, B.J., & Anderson, R.E. (2019). *Multivariate data analysis* (8th ed.). Boston: Cengage.

Hansla, A., Gamble, A., Juliusson, A., & Garling, T. (2008). The relationships between awareness of consequences, environmental concern, and value orientations. *Journal of Environmental Psychology, 28,* 1-9. https://doi.org/10.1016/j.jenvp.2007.08.004

Helmi, A., Marty, Y., Umi Kaltum, O., & Faisal, Y. (2023). The influence of hedonic values and extraversion on online impulse buying: Empirical evidence from Indonesia. *Innovative Marketing*, *19*(1), 48-58. https://doi.org/10.21511/im.19(1).2023.05

Heller, Marit, H., & Vatn, A. (2017). The divisive and disruptive effect of a weight-based waste fee. *Ecological Economics*, *131*(C), 275-285. https://doi.org/10.1016/j.ecolecon.2016.09.002

He, X., & Zhan, W. (2018). How to activate moral norm to adopt electric vehicles in China? An empirical study based on extended norm activation theory. *Journal of Cleaner Production*, *172*, 3546-3556, https://doi.org/10.1016/j.jclepro.2017.05.088

Hendrik, N., & de Jong, G. (2020). The impact of values and future orientation on intention formation within sustainable entrepreneurship. *Journal of Cleaner Production*, 266, 122052.

Henry, M., Bauwens, T., Hekkert, M., & Kirchherr, J. (2020). A typology of circular startups: An Analysis of 128 circular business models. *Journal of Cleaner Production*, *245*, 118528, https://doi.org/10.1016/j.jclepro.2019.118528

Hu, L.T., & Bentler, P.M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*(1), 1-55. https://doi.org/10.1080/10705519909540118

Huta, V., & Ryan, R.M. (2010). Pursuing pleasure or virtue: the differential and overlapping well-being benefits of hedonic and eudaimonic motives. *Journal of Happiness Studies*, *11*, 735-762. https://doi.10.1007/s10902-009-9171-4

Inigo, E.A., & Blok, V. (2019). Strengthening the socio-ethical foundations of the circular economy: Lessons from responsible research and innovation. *Journal of Cleaner Production*, *233*, 280-291. https://doi.org/10.1016/j.jclepro.2019.06.053

Johansson, N., & Krook, J. (2021). How to handle the policy conflict between resource circulation and hazardous substances in the use of waste?. *Journal of Industrial Ecology*, *25*(4), 994-1008. https://doi.org/10.1111/jiec.13103

Katinka, J.P., Bommel, Q.K.V., Erkelens, A.M., & Wempe, J. (2023). People at the heart of circularity: A mixed methods study about trade-offs, synergies, and strategies related to circular and social organizing. *Journal of Cleaner Production*, *387*, (135780), https://doi.10.1016/j.jclepro.2022.135780

Kirchherr, J., Yang, N.H.F., Schulze-Spüntrup, F., Heerink, M.J., & Hartley, K. (2023). Conceptualizing the Circular Economy (Revisited): An Analysis of 221 Definitions, *Resources, Conservation and Recycling*, *194*, https://doi.org/10.1016/j.resconrec.2023.107001

Krajnc, D., Kovačič, D., Žunec, E., Brglez, K., Kovačič, & Lukman, R. (2022). Youth Awareness and Attitudes towards a Circular Economy to Achieve the Green Deal Goals. *Sustainability*, *14*, 12050. https://doi.org/10.3390/su141912050

Kumar, A., & Pandey, M. (2023). Social Media and Impact of Altruistic Motivation, Egoistic Motivation, Subjective Norms, and EWOM toward Green Consumption Behavior: An Empirical Investigation. *Sustainability*, *15*, 4222. https://doi.org/10.3390/su15054222

Kębłowski, W., Lambert, D., & Bassens, D. (2020). Circular economy and the city: An urban political economy agenda. *Culture and Organization*, *26*(2), 142-158. https://doi.org/10.1080/14759551.2020.1718148

Khan, O., Daddi, T., & Iraldo, F. (2021). Sensing, seizing, and reconfiguring: Key capabilities and organizational routines for circular economy implementation. *Journal of Cleaner Production*, *287*, 125565. https://doi.org/10.1016/j.jclepro.2020.125565

Kirby, D.A., El-Kaffass, I., & Healey-Benson, F. (2022). Harmonious entrepreneurship: evolution from wealth creation to sustainable development. *Journal of Management History*, *28*(4), 514-529. https://doi.org/10.1108/JMH-11-2021-0060

Legros, S., & Cislaghi, B. (2020). Mapping the Social-Norms Literature: An Overview of Reviews. *Perspectives on Psychological Science*, *15*(1), 62-80. https://doi.org/10.1177/1745691619866455

Linder, M., & Williander, M. (2017). Circular Business Model Innovation: Inherent Uncertainties. *Business Strategy and Environment*, *26*(2), 182-196. https://doi.org/10.1002/bse.1906

Mansilla-Obando, K., Jeldes-Delgado, F., & Guiñez-Cabrera, N. (2022). Circular Economy Strategies with Social Implications: Findings from a Case Study. *Sustainability*, *14*, 13658. https://doi.org/10.3390/su142013658

Mavropoulos, A., & Nilsen, A.W. (2020). *Industry 4.0 and circular economy: Towards a wasteless future or a wasteful planet?* Hoboken, NJ: Wiley.

Moraga, G., Huysveld, S., Mathieux, F., Blengini, G.A., Karel, L.A., Acker, V., Meester, S.D., & Dewulf, J. (2019). Circular economy indicators: What do they measure?. *Resources, Conservation, and Recycling*, *146*, 452-461.

Niskanen, J., Anshelm, J., & Mclaren, D. (2020). Local conflicts and national consensus: The strange case of circular economy in Sweden. *Journal of Cleaner Production*, *261*, 121117. https://doi.org/10.1016/j.jclepro.2020.121117

Oh, J., & Ki, E-J. (2023). Extending norm activation theory to understand publics' support for environmentally responsible organizations. *Corporate Communications: An International Journal*, *28*(3), 381-399. https://doi.org/10.1108/CCIJ-03-2022-0024

Osburg, V.-S. A. P., Y. V. *et al.* (2019). The influence of contrasting values on consumer receptiveness to ethical information and ethical choices. *Journal of Business Research*, *104*. 366-379

Panait, M., Hysa, E., Raimi, L., Kruja, A., & Rodriguez, A. (2022). Guest editorial: Circular economy and entrepreneurship in emerging economies: opportunities and challenges. *Journal of Entrepreneurship in Emerging Economies*, *14*(5), 673-677. https://doi.org/10.1108/JEEE-10-2022-487

Prakash, G., Choudhary, S., Kumar, A., Garza-Reyes, J.A., Khan, S.A., & Panda, T.K. (2019). Do altruistic and egoistic values influence consumers' attitudes and purchase intentions toward eco-friendly packaged products?. *An empirical investigation, Journal of Retailing and Consumer Services, 50*, 163-169. https://doi.org/10.1016/j.jretconser.2019.05.011

Picot-Coupey, K., Krey, N., Huré, E., & Ackermann, C-L. (2021). Still work and/or fun? Corroboration of the hedonic and utilitarian shopping value scale. *Journal of Business Research*, *126*, 578-590. https://doi.org/10.1016/j.jbusres.2019.12.018

Rashidi, H.H., Albahra, S., Robertson, S., Tran, N., & Hu, B. (2023). Common statistical concepts in the supervised Machine Learning arena. *Frontiers in Oncology*, 13, https://doi.org/10.3389/fonc.2023.1130229

Rees, C.S., Breen, L.J., Cusack, L., & Hegney, D. (2015). Understanding individual resilience in the workplace: the international collaboration of workforce resilience model. *Frontiers in Psychology*, *6*, https://doi.org/10.3389/fpsyg.2015.00073

Rovanto, S., & Finne, M. (2023). What Motivates Entrepreneurs into Circular Economy Action? Evidence from Japan and Finland. *Journal of Business Ethics, 184*. 71-91. https://doi.org/10.1007/s10551-022-05122-0

Ruskin, J., Seymour R.G., & Webster, C.M. (2016). Why create value for others? An exploration of social entrepreneurial motives*. Journal of Small Business Management, 54*, 1015-1037.

Ryff, C.D. (2019). Entrepreneurship and Eudaimonic Well-Being: Five Venues for New Science. *Journal of Business Venturing*, *34*(4), 646-663. https://doi.org/10.1016/j.jbusvent.2018.09.003

Salesa, A., León, R., & Moneva, J.M. (2022). Is Business Research Shaping the Circle? Systematic and Bibliometric Review of Circular Economy Research. *Sustainability*, *14*, 8306. https://doi.org/10.3390/su14148306

Salvioni, D.M., Bosetti, L., & Fornasari, T. (2022). Implementing and Monitoring Circular Business Models: An Analysis of Italian SMEs. *Sustainability*, *14*, 270. https://doi.org/10.3390/su14010270

Savari, M., Damaneh, H.E., & Damaneh, H.E. *et al.* (2023). Integrating the norm activation model and theory of planned behavior to investigate farmer pro-environmental behavioral intention. *Science Reports, 13*, 5584. https://doi.org/10.1038/s41598-023-32831-x

Seymour, R.J., Webster, R.G., & Cynthia, M. (2016). Why Create Value for Others? An Exploration of Social Entrepreneurial Motives. *Journal of Small Business Management*, *54*(4), 1015-1037, https://doi.org/10.1111/jsbm.12229

Schwartz, S.H., & Butenko, T. (2014). Values and behavior? Validating the refined value theory in Russia. *European. Journal of Social Psychology, 44*, 799-813. https://doi.org/10.1002/ejsp.2053

Schwartz, S.H. (1992). Universals in the content and structure of values: theoretical advances and empirical tests in 20 countries. *Advances in Experimental Social Psychology*, *25*, 1-65. https://doi.org/10.1016/S0065-2601(08)60281-6

Schwartz, S.H. (1977). Normative Influences on Altruism. In B. Leonard (Ed.) *Advances in Experimental Social Psychology* (vol. 10, pp. 221-279). Academic Press.

Selig, J.P., & Little, T.D. (2012). Autoregressive and cross-lagged panel analysis for longitudinal data. In B. Laursen, T.D. Little, & N.A. Card (Eds.), *Handbook of developmental research methods* (p. 265-278). NY: The Guilford Press.

Septiani, S., Najib, M., & Sumarwan, U. (2020). Egoistic and Altruistic Motives on the Purchasing Behavioral Model of Organic Food in the Indonesian Market, Conference: Proceedings of the 2019 *International Conference on Organizational Innovation*, January. https://doi.org/10.2991/icoi-19.2019.8

Shen, M., & Wang, J. (2022). The Impact of Pro-environmental Awareness Components on Green Consumption Behavior: The Moderation Effect of Consumer Perceived Cost, Policy Incentives, and Face Culture. *Frontiers in Psychology*, *13*, https://doi.org/10.3389/fpsyg.2022.580823

Singh, P., Sahadev, S., Wei, X., & Henninger, C.E. (2023). Modeling the antecedents of consumers' willingness to pay for eco-labeled food products. *International Journal of Consumer Studies*, *47*(4), 1256-1272. https://doi.org/10.1111/ijcs.12900

Staats, H., & Wilke, Henk, A.M. (2007). Situational and Personality Factors as Direct or Personal Norm Mediated Predictors of Pro-environmental Behavior: Questions Derived from Norm-activation Theory. *Basic and Applied Social Psychology*, *29*(4), 323-334. https://doi.10.1080/01973530701665058

Stern, P.C., Dietz, T., Abel, T.D., Guagnano, G., & Kalof, L. (1999). A value-belief-norm theory of support for social movements: the case of environmentalism. *Human Ecology Review, 6*, 81-97. Retrieved from https://www.humanecologyreview.org/pastissues/her62/62sternetal.pdf on July 2, 2023.

Sutherland, B.R. (2020). Sustainably Heating Heavy Industry. *Joule*, *4*(1), 14-16, https://doi.org/10.1016/j.joule.2019.12.020

Tabachnik, B.G., & Fidell, L.S. (2007). *Using Multivariate Statistics.* London: Pearson International Education.

Tarka, P., Harnish, R.J., & Babaev, J. (2022). From materialism to hedonistic shopping values and compulsive buying: A mediation model examining gender differences. *Journal of Consumer Behavior*, *21*(4), 786-805. https://doi.org/10.1002/cb.2037

Temesgen, A., Storsletten, V., & Jakobsen, O. (2021). Circular economy – Reducing symptoms or Radical Change? *Philosophy of Management*, *20*(1), 37-56. https://doi.org/10.1007/s40926-019-00112-1

Tian, H., & Liu, X. (2022). Pro-Environmental Behavior Research: Theoretical Progress and Future Directions. *International Journal of Environmental Research and Public Health*, 31, *19*(11), 6721-6721. https://doi.org/10.3390/ijerph19116721

Tran, N.K., Albahra, S., Pham, T., Holmes, J., Greenhalgh, D., Palmieri, T.L. *et al*. (2020). Novel application of an automated-machine learning development tool for predicting burn sepsis: proof of concept. *Science Reports, 10*(1), 12354. https://doi.org/0.1038/s41598-020-69433-w

Trautwein, U., Babazade, J., Trautwein, S., & Lindenmeier, J. (2023). Exploring pro-environmental behavior in Azerbaijan: an extended value-belief-norm approach. *Journal of Islamic Marketing*, *14*(2), 523-543. https://doi.org/10.1108/JIMA-03-2021-0082

Van der Werff, E., & Steg, L. (2022). The psychology of participation and interest in smart energy systems: Comparing the Value-Belief-Norm theory and the value-identity-personal norm model. *Energy Research and Social Science*, *22*, 107-114.

Völker, T., Kovacic, Z., & Strand, R. (2020). Indicator development as a site of collective imagination? The case of European Commission policies on the circular economy. *Culture and Organization*, *26*(2), 103-120. https://doi.org/10.1080/14759551.2019.1699092

Vuorio, A.M., Puumalainen, K., & Fellnhofer, K. (2018). Drivers of entrepreneurial intentions in sustainable entrepreneurship. *International Journal of Entrepreneurial Behavior Research*, *24*, 359-381

Wang, B., Wang, X., Guo, D., Zhang, B., & Wang, Z. (2018). Analysis of Factors Influencing Residents' Habitual Energy-Saving Behaviour Based on NAM and TPB Models: Egoism or Altruism?. *Energy Policy*, *116*, 68-77.

Wei, S., Liu, F., She, S., & Wu, R. (2022). Values, Motives, and Organic Food Consumption in China: A Moderating Role of Perceived Uncertainty. *Frontiers in Psychology*, *13*, https://doi.org/10.3389/fpsyg.2022.736168

Wei, Q., Lv, D., Lin, Y., Zhu, D., Liu, S., & Liu, Y. (2023). Influence of Utilitarian and Hedonic Attributes on Willingness to Pay Green Product Premiums and Neural Mechanisms in China: An ERP Study. *Sustainability*, *15*, 2403. https://doi.org/10.3390/su15032403

Yulistyawati, E.T., Andriani, K., & Sunarti, U. (2020). The influence of utilitarian Value, hedonic Value, Social Value, and perceived risk on customer satisfaction: Survey of e-commerce customers in Indonesia, *Business: Theory and Practice*, Vilnius, *21*(2), 613-622.

Yasir, N., Mahmood, N., Mehmood, H.S., Rashid, O., & Liren, A. (2021). The Integrated Role of Personal Values and Theory of Planned Behavior to Form a Sustainable Entrepreneurial Intention. *Sustainability*, *13*, 9249. https://doi.org/10.3390/su13169249

Zhang, L., Ruiz-Menjivar, J., Luo, B., Liang, Z., & Swisher, M.E. (2020). Predicting climate change mitigation and adaptation behaviors in agricultural production: A comparison of the theory of planned behavior and the value-belief-norm theory. *Journal of Environmental Psychology, 68*, 101408. https://doi.org/10.1016/j.jenvp.2020.101408

Zioło, M., Bąk, I., & Spoz, A. (2023). Theoretical framework of sustainable value creation by companies. What do we know so far?. *Corporate Social Responsibility and Environmental Management*, *30*(5), 2344-2361. https://doi.org/10.1002/csr.2489

Appendix: Sample characteristics

Industry Type	Business Category	Sample Size	Business Age	Business Size (Employees)
Manufacturing	Cement Production	39	20	<200
	Aluminium Production	18	22	<150
	Household Goods	30	15	<150
	Electronics Equipment	29	9	<100
	Machine Tools	28	8	<100
	Auto Parts	36	11	<100
	Electrical Equipment	30	12	<100
Materials	Construction Materials	25	8	<100
	Metals	22	12	<100
	Mining	15	13	<100
	Chemicals	16	12	<100
Agriculture	Fertilizers	22	10	<100
	Seeds	17	14	<100
	Soil	18	15	<50
	Irrigation equipment	15	15	<50
Energy	Petroleum Products	12	20	<50
	Drilling	14	25	<50
	Pipelines	11	23	<40
Real Estate	Construction	12	21	<30
Consumer Goods	Apparel	15	11	<50
	Food	12	8	<30
	Diary	11	5	<50
Services	Gas	9	4	<50
	Entertainment	10	6	<20
	Hospitality	6	8	<20
	Travel	5	10	<20
Total		477		

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The contribution share of authors is equal and amounted to 50% for each of them.
TA – conceptualisation, Methods, Data Analysis- JW – Literature, Discussion, Interpretation, Conclusions.

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Acknowledgements and Financial Disclosure

The article is not financed or funded by any organization. We would like to thank the anonymous referees for their useful comments, which allowed us to increase the value of this article.

Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Published by Krakow University of Economics – Krakow, Poland

Ministry of Education and Science
Republic of Poland

The journal is co-financed in the years 2022-2024 by the Ministry of Education and Science of the Republic of Poland in the framework of the ministerial programme "Development of Scientific Journals" (RCN) on the basis of contract no. RCN/SP/0583/2021/1 concluded on 13 October 2022 and being in force until 13 October 2024.

Entrepreneurial Business and Economics Review

2024, Vol. 12, No. 2

10.15678/EBER.2024.120211

Micro-firms' productivity growth in Poland before and during COVID-19: Do industry and region matter?

Emilia Gosińska, Mariusz Górajski, Magdalena Ulrichs

ABSTRACT

Objective: This study proposes a novel empirical analysis of the total factor productivity (TFP) growth for Polish microenterprises, focusing on the effect of the global lockdown in 2020. We employed firm-level data covering enterprises with below ten employees to evaluate micro-firms' productivity performance in Polish regions and sectors in 2010-2020. There are three main goals. Firstly, we estimated the production function elasticities for two-digit NACE sectors of microenterprises. Secondly, we performed the TFP growth decomposition between regions and sectors for Polish microenterprises. Thirdly, we aimed to identify the between- and within-firm components of productivity growth in microenterprises.

Research Design & Methods: We applied control function methods to estimate the production function for two-digit NACE Rev. 2 divisions and determine individual enterprises' TFP. We based the estimations on an unbalanced panel dataset containing about 1 329 106 firms yearly. Thereafter, we employed the Olley-Pakes decomposition of TFP growth to analyse the efficiency of resource allocation measured by the between- and the within-firm component that captures the gains from firms' productivity performance.

Findings: We observed substantial heterogeneity between sectoral and regional TFP growths during the year of the COVID-19 pandemic outbreak. Productivity of microenterprises from the following sectors: construction, wholesale and retail trade, professional, scientific and technical activities was influenced considerably by the lockdown. Microenterprises from regions with the highest gross value added (GVA) shares displayed outstanding productivity during the COVID-19 pandemic concerning weighted TFP levels and TFP growths. Based on the Olley-Pakes decomposition of TFP growth, we confirmed that before 2020, the TFP growth of microenterprises in Poland was driven by within-firm gains. However, during the COVID-19 pandemic outbreak, the efficiency of resource allocation was an essential component of TFP growth.

Implications & Recommendations: Micro-firms play a significant role in the economy, but TFP analyses of microenterprises are sparse. Through this study, we showed that the pandemic outbreak significantly impacted micro-firms' performance. We identified the industries and regions of the Polish economy that are the main drivers of productivity growth and those where the economic efficiency is below the expected performance. This study might help to identify regions and sectors of the Polish economy that suffer from substantial inefficiencies and thus require policy attention.

Contribution & Value Added: As the capital-driven development model might be reaching its limits in Poland, policymakers should focus on TFP as a main growth force. This study is the first empirical analysis of the TFP growth for microenterprises in Poland. We employed firm-level data from Statistics Poland covering microenterprises to evaluate micro-firms' productivity performance in Polish regions and sectors before and during COVID-19.

Article type:	research article
Keywords:	TFP growth of microenterprises; production function estimation; control function methods; the Olley-Pakes decomposition, panel data model
JEL codes:	C14, C23, D21, D24

Received: 7 July 2023 Revised: 31 October 2023 Accepted: 12 January 2024

Suggested citation:

Gosińska, E., Górajski, M., & Ulrichs, M. (2024). Micro-firms' productivity growth in Poland before and during COVID-19: Do industry and region matter?. *Entrepreneurial Business and Economics Review,* 12(2), 177-200. https://doi.org/10.15678/EBER.2024.120211

INTRODUCTION

There exists an extensive literature on the various approaches to measuring productivity (Ahmed & Bhatti, 2020). Productivity is classified into two main categories: partial factor productivity and multifactor productivity. The partial factor productivity is used to compare the productivity of each unit factor to the output production. Multifactor productivity is the ratio of total output to total inputs. It represents the total effect of all resources used in producing the total output. Furthermore, capital-, material-, or labour-based productivity and total factor productivity (TFP) are the four primary forms of productivity in the production process. The last two substantial measures – labour productivity and total factor productivity – are usually used to measure productivity as the technical efficiency of production (IMF, 2019; World Bank, 2021). Labour productivity reflects each employee's value, while increased capital employed per worker and rising TFP are the two main drivers of labour productivity development. The TFP measures how effectively inputs (such as labour and capital) are converted into outputs. Measuring TFP as the technical efficiency of production is essential from many practical points of view. The TFP growth sustains output growth in the long run as input growth, which is subject to diminishing returns, is insufficient to generate more and more output growth. Aggregated TFP and technology are distinct notions, however, both play an essential role in understanding economic growth (Basu & Fernald, 2002). Therefore, TFP growth is responsible for long-run growth, reflecting the growth potential (Krugman, 1997; Mahadevan, 2003).

Correct measurement of total factor productivity and the indication of the main determinants of enterprise productivity are necessary to correctly describe the production process and resource management. The measurement of the unobserved TFP level is mainly possible by determining the Solow residual from the production function equation. For this purpose, in the first step, we estimated the production function at the firm level and in the second, we determined enterprises' individual productivity (van Beveren, 2012). When aggregated, an enterprises' total factor productivity can indicate productivity at a selected sector, region, or economy level. There are three primary ways that aggregated TFP performance might improve. Firstly, productivity might expand due to increased business efficiency through better technology adoption, improved management capabilities, or innovation (the 'within-firm' component). Secondly, more effective businesses might gain market share within their industry, which results in allocating labour and capital to more effective businesses ('between-firm' component). Thirdly, high-productivity companies can expand into new markets, forcing less successful businesses to shut down. Unexpected shocks may influence TFP significantly and this impact can be different for different sectors or regions of the economy. Therefore, the TFP growth decomposition shows these idiosyncratic features and is particularly important for policymakers.

Several studies indicate that growth in Poland and convergence are driven mainly by factors affecting structural competitiveness, especially innovation activity, which are essential TFP components (Grela *et al.*, 2017; World Bank, 2021). Noteworthy, the Polish economy was on an upward trend before the COVID-19 outbreak. According to the International Monetary Fund's (IMF) World Economic Outlook (published in October 2019; see IMF, 2019b), the GDP growth forecast for 2020 was equal to 3.1%. However, due to the COVID-19 pandemic, we observed the decline of the Polish economy to 5.1 percentage points below expected growth. Nevertheless, this value was a moderate slowdown compared to many other countries. Since microenterprises play a significant role in the Polish economy, their productivity is a substantial driver of the total TFP in Poland.

Figure 1 presents the microenterprise sector's contribution to the Polish economy's leading economic indicators. Between 2010-2020, non-financial microenterprises constituted about 96.2% of all non-financial enterprises, employing approximately 39.6% of the persons employed. On average, they generated about 22.4% of total revenues and 17.0% of total investment outlays. Moreover, non-financial microenterprises produced 29.1% of total production and 26.7% of gross value added. In 2020, there were 2261.9 thousand non-financial enterprises in Poland, which means an increase of 31.0% compared to 2010. Most of that increase was due to the growing number of microenterprises. In 2020, there were 2194.2 thousand microenterprises, which means an increase of 32.6% compared to 2010.

In contrast, the number of small and medium-sized entities decreased from 2010 to 2020, in the case of small entities by 5.9% and medium-sized entities by 8.9%. In the analysed period, the increase in employment in microenterprises amounted to 23.2% (2020 compared to 2010), while in the entire sector of non-financial enterprises, this increase amounted to about 12.9%. Moreover, in terms of revenues (92.2% vs 59.5%), value added (67.6% vs 59.2%), and value of production (61.8% vs 55.6%), thus we can notice that microenterprises generated higher growth of these economic indicators than larger firms. However, microenterprises recorded an 18.6% decrease in the value of investment outlays, while in the entire non-financial sector, these assets increased by 43.3% (Statistics Poland, 2021).

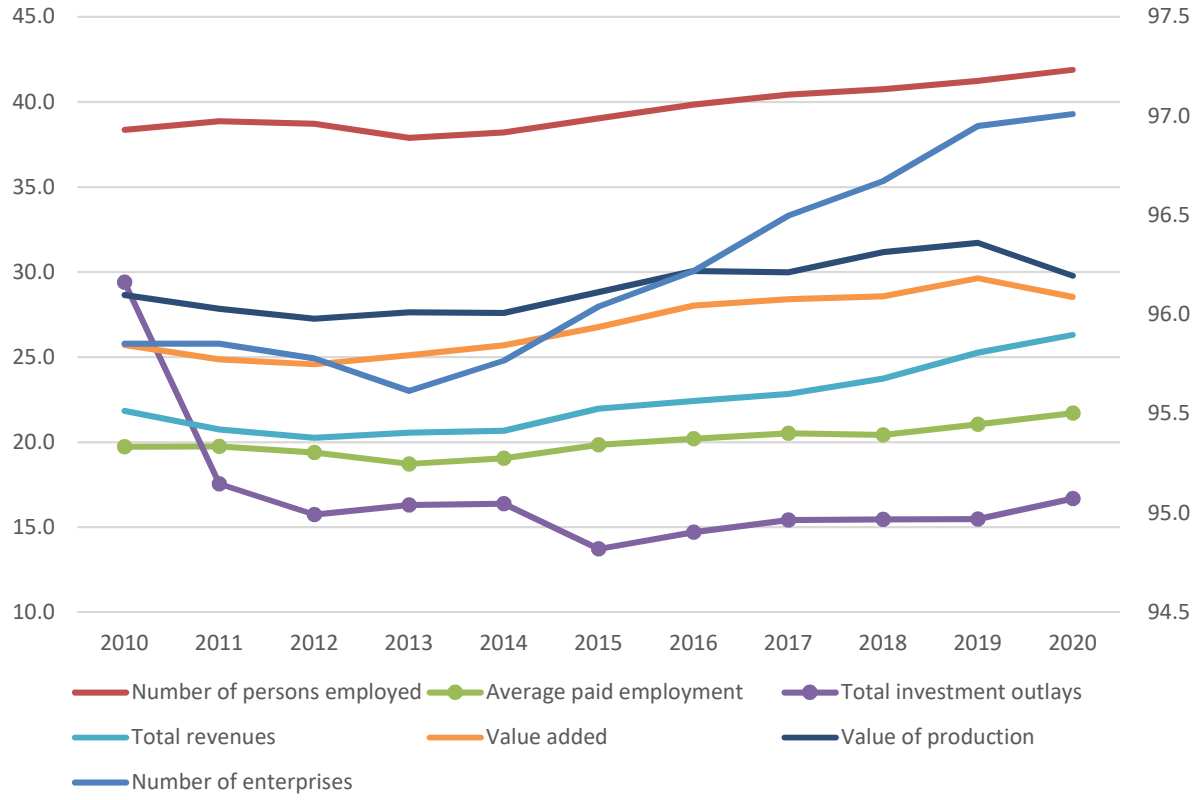


Figure 1. Relevance of micro-firms for the economy

Note: All Figures present the microenterprise sector's shares in the Polish economy's non-financial enterprise sector (in p.p.). All coloured lines are measured at the left axis. The number of enterprises is measured at the right axis.
Source: own elaboration based on Statistics Poland data 'Activity of Non-Financial Enterprises' (2010-2020).

The appropriate measure of TFP is essential also for entrepreneurs who launch new ventures and make additional investments. By introducing new technologies or working methods, these investments can boost productivity, create new jobs, and raise competition. The individual's entrepreneurism and initiative bring all the various elements of factor inputs, management processes of production and investment in innovative activities together to drive the firm's production activities. Without the entrepreneur to coordinate these elements, effectively use and deploy them, seek out novel business opportunities, and make new investments, the economic churn that propels productivity growth would likely be damped (Schumpeter & Backhaus, 1934; Kirzner, 1973). Lastly, scholars show that country-level entrepreneurship triggers TFP by increasing the effects of Kirznerian and Schumpeterian entrepreneurship (Lafuente *et al.,* 2020). Usually, companies react to crises by changing their strategies, which is more difficult for micro-firms (Kaszowska-Mojsa, 2020). The sudden spread of the COVID-19 pandemic affected small businesses, dominated by family businesses. Since they are not prepared for the prolonged state of uncertainty and tension threatening the continuity of their operations, their financial stability is endangered (Marjański & Sułkowski, 2021).

Due to the considerable importance of microenterprises in all economic categories, the impact of the COVID-19 pandemic on microenterprises' productivity spread over the whole economy. In this study, we adopted a firm-level approach using TFP measurements to discover the overall productivity factors and the underlying heterogeneity of micro-firms in Poland with an emphasis on pandemic effects. This research supplements the TFP study for small, medium, and large enterprises (SMLEs) conducted under the collaboration of Statistics Poland with the World Bank (World Bank, 2021). Our main contribution consists of several dimensions. Firstly, we used a microeconometric model for TFP estimation based on micro-firm data from the annual survey of the economic activity of microenterprises. We applied the Levinsohn-Petrin (2003) model with the Ackerberg, Caves, and Frazer (2015) correction to estimate the elasticities of the production function for two-digit NACE sectors of microenterprises. Secondly, based on individual TFP indices, we provided sectoral and regional decompositions of micro-firms' TFP growth before and during COVID-19. Thirdly, we identified the within- and between-firm effects of TFP growth.

The remainder of this article is organized as follows. Section 2 presents a literature review. Section 3 describes the data and the methodology for TFP estimation and aggregation. Section 4 presents the empirical results and discussion. Section 5 concludes the article.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Many scholars and institutions regularly perform TFP analyses of small (S), medium (M), and large (L) enterprises (Es), but the studies of microenterprises (MiEs) are very sparse. Let us recall the recent crucial studies on TFP for MiSMLEs. Using Italian SMEs data Hall, Lotti, and Mairesse (2009) prove that innovation positively impacts a firm's productivity, but especially larger and older firms seem to be less productive. Baumann and Kritikos (2016) consider the relationship between research and development outlays, innovation and productivity of MiSMEs for the German economy. Chen and Lee (2020) confirm the significant impact of firm size premium on total factor productivity growth in Europe after the Global Financial Crisis. Whereas the influence of financial constraints on total factor productivity in China was found by Wong *et al.* (2023). This effect was proved to be more serious in small-scale firms, non-state firms, and non-energy firms. Bloom *et al.* (2020) present a micro-data analysis of the impact of COVID-19 on productivity in the UK. Their results suggest that the negative within-firm effect was partially offset by the positive between-firm effect. It is also proved that the impact of COVID-19 on productivity across firms was heterogeneous, which means that more consumer-facing firms are more likely to experience productivity fall.

There are only several studies on the TFP for SMLEs in Poland (Hagemejer, 2006; Hagemejer & Kolasa, 2011; Albinowski *et al*., 2015; IMF, 2019; Górajski & Błażej, 2020; World Bank, 2017). After the economic transformation, the productivity growth of enterprises was driven by refinements in allocative efficiency and the development of highly productive firms. To the best of our knowledge, the TFP growth decomposition was never applied to firm-level data before 1997, most likely due to restricted access to such data in Poland. Albinowski *et al*. (2015) and World Bank (2017) are pioneering studies that employed the Melitz-Polanec method to decompose the productivity growth of SMLEs and investigated firm-level data in Poland from the manufacturing sector between 1997 and 2013. These studies reveal an impressively fast TFP growth in manufacturing during the given period, primarily propelled by resource reallocation from less to more productive firms. The between component accounted for three-fourths of the aggregate TFP growth. In particular, Górajski and Błażej (2020) confirm the dependence of firm-level TFP on the form of ownership, investment rate, export status, their size, and the market concentration index as well as a sector differentiation of TFP distributions for SMLEs. Moreover, Gradzewicz and Muck (2019) analysed the dynamics of SMLEs markups from the 2002-2016 period and showed that markets globalization and changes in the global value chains are the main factors behind the recent fall in markups in Poland. The most recent report referring to the productivity of Polish SMLEs in manufacturing, construction, and non-financial services between 2009-2019 was the outcome of the cooperation of the World Bank and Statistics Poland (World Bank, 2021). It is concluded that despite the extraordinary economic growth in Poland, productivity growth in the manufacturing

sector has stagnated since 2012 and is much lower than in services and construction. Resource allocation efficiency (measured by the between-firm effect) has deteriorated over time in the manufacturing industry. It has been responsible for slowing down productivity growth in the sector, while between effects have improved TFP growth in construction and services.

Many regional or sectoral TFP analyses referring to the aggregated Cobb-Douglas production function under constant economies of scale in each region or sector are performed using aggregated panel data (Dańska-Borsiak & Laskowska 2012; Sulimierska, 2014; Welfe & Karp, 2017 and references therein). Świeczewska (2013) shows the analysis of the total factor productivity for the manufacturing industry sectors according to the degree of advancement of technology. Heterogeneity in elasticities of production functions in various sectors of the Polish economy was confirmed for panel aggregated data by Gosińska and Ulrichs (2020). Moreover, the KLEMS productivity accounting is used to analyse the growth decomposition for the Polish regions and sectors in Kotlewski (2021).

To the best of our knowledge, there are no studies concerning the TFP analyses of microenterprises in Poland. Therefore, we aimed to fill this research gap. However, there is a spread of literature concerning the vulnerability and resilience of microenterprises to COVID-19. Research based on the surveys, interviews or case studies of microenterprises confirms that the response to COVID-19 depends on industry, region, financial situation, state aid, and the ability to adapt to the turbulent market situation (Kochaniak *et al.*, 2023; Osińska, & Zalewski, 2023; Zając *et al.*, 2022; Michalski, 2022; Kluzek, 2022; Pyrkosz-Pacyna *et al*., 2021; Marjański & Sułkowski, 2021; Dankiewicz *et al*., 2021). The conclusions from the above research studies allowed us to formulate the following hypotheses:

H1: There is a significant sectoral heterogeneity of total factor productivity in the Polish microenterprises sector.

H2: There is a significant regional heterogeneity of total factor productivity in the Polish microenterprises sector.

H3: The COVID-19 pandemic had an impact on productivity in microenterprises that was heterogeneous across industries.

H4: Micro-firms from various regions could have successfully responded to overcome the COVID-19 pandemic's restrictions and limitations and could have achieved exceptionally high TFP growth in 2020.

H5: In 2020, the TFP growth was mainly induced by the between-firm effect, whereas before 2020 within-firm effect was the main driver of TFP growth for microenterprises in Poland.

RESEARCH METHODOLOGY

Data

We performed the estimations using yearly labour, physical capital, and production output data approximated by the real gross value-added for microenterprises. Data on the gross value-added, capital, and labour originate from the annual survey of the economic activity of microenterprises (EAME) of Statistics Poland, which examines the business activity of Polish enterprises with fewer than ten employees and is based on the statistical form 'SP-3- Survey on economic activity.'

Statistics Poland implemented the sample survey in the EAME using the representative method with a stratified sampling scheme.[1] The sample covers about 4% of the total population. We expanded the representative sample by weights, which are determined to replicate total employment in the population of microenterprises in Poland. Finally, our annual data cover 11 years of observations between 2010 and 2020 and make an unbalanced panel dataset containing about 1 329 106 firms yearly. The final sample covered about 68% of the total microenterprises and nearly 100% of the persons employed.

The enterprise's gross value-added Y is the difference between its global output and intermediate consumption and L is the number of employees. Physical capital K is defined as the enterprise annual fixed assets. The final measurement for variables Y and K is determined by calculating the real gross

[1] For details see Methodological report. Non-financial enterprises surveys Statistics Poland, Warsaw 2019, p. 25.

value-added and real physical capital of the enterprise at constant average prices from 2015. For this purpose, we used capital and gross value-added deflators for the two-digit NACE Rev. 2 divisions.[2]

Methodology of Production Function Estimation

We estimated the production function by applying the Levinsohn and Petrin (2003) model with Ackerberg, Caves, and Frazer (2015) correction to determine the enterprise's individual TFP. We assumed that the gross value-added Y_{it} for enterprise i from the two-digit NACE Rev. 2 division G_d in period t is determined by the Cobb-Douglas function:

$$Y_{it} = TFP_{it} K_{it}^{\beta_{k,d}} L_{it}^{\beta_{l,d}} e^{\epsilon_t}, i \in G_d \quad (1)$$

in which ϵ_t is i.i.d output shock, TFP_{it} is the unadjusted total factor productivity; L_{it}, K_{it} are the quantities of labour and capital and L_{it} is the number of employees at the end of period t. The variables Y_{it} and K_{it} are defined as real gross value-added and real physical capital levels in the microenterprise. The parameters $\beta_{k,d}$ and $\beta_{l,d}$ denote the gross value-added elasticities of capital and labour, respectively, for homogenous groups of firms G_d representing the two-digit NACE Rev. 2 division of the economy.

Hereafter, let y_{it}, l_{it}, k_{it}, and ω_{it} denote the logarithms of variables Y_{it}, L_{it}, K_{it} , and TFP_{it}, respectively. The firm-level production function from (1) can be estimated using control function methods, such as Olley and Pakes' (1996) model (OP model) and Levinsohn and Petrin's (2003) model (LP model), both of which can be enhanced by the correction made by Ackerberg, Caves, and Frazer (2015) (ACF). Within this framework, the productivity coefficient ω_{it} is a state variable in the company-decision problem, which involves the selection of production factors. We determined the enterprise's individual TFP by finding the output elasticities from equation (1). Control function methods use different proxy variables to approximate productivity shocks and estimate a company's probability of survival in the market. Moreover, the productivity coefficients acknowledge the Markovian structure. As a result, the OP and LP models produce consistent estimates of output elasticities that solve the endogeneity problem of explanatory variables and attrition (van Beveren, 2012). Due to data availability restrictions for each of the two-digit NACE Rev. 2 divisions, we estimated production function using the LP model with regional and time effects. Thus, we assumed that energy and materials expenditures are a proxy for unobserved TFP indices in the LP model.

Estimating the production equation within the LP model with ACF correction is a two-stage procedure. We employed the ACF correction to the control function approach since labour input may be dependent on the productivity estimated using a low-order polynomial of capital and proxy variables. In the first stage, we avoided this collinearity problem by assuming that the unobservable productivity shocks ω_{it} can be approximated using a polynomial function of capital k_{it},, labour l_{it}, and proxy variable m_{it}, represented by the energy and materials outlays:

$$\omega_{it} = h(k_{it}, l_{it}, m_{it}) \quad (2)$$

Then, the firm-level output is of the form

$$y_{it} = f(k_{it}, l_{it}, m_{it}) + \epsilon_{it} \quad (3)$$

in which $f(k_{it}, l_{it}, m_{it}) = h(k_{it}, l_{it}, m_{it}) + \beta_{k,d} k_{it} + \beta_{l,d} l_{it}$. Thus $\omega_{it} = f(k_{it}, l_{it}, m_{it}) - \beta_{k,d} k_{it} - \beta_{l,d} l_{it}$. Equation (2) can be non-parametrically estimated, approximating f by n-th degree polynomial. In the second stage, the Markovian structure of ω_{it} implies

$$\omega_{it} = g_t(\omega_{it-1}) + \xi_{it} = g_t\left(\hat{f}(k_{it-1}, l_{it-1}, m_{it-1}) - \beta_{k,d} k_{it-1} - \beta_{l,d} l_{it-1}\right) + \xi_{it} \quad (4)$$

in which ξ_{it} is productivity shock and we substitute f with the theoretical production $\hat{f}$ from the first step. Hence the production function can be written as

$$y_{it} = \omega_{it} + \beta_{k,d} k_{it} + \beta_{l,d} l_{it} + \epsilon_t = g\left(\hat{f}(k_{it-1}, l_{it-1}, m_{it-1}) - \beta_{k,d} k_{it-1} - \beta_{l,d} l_{it-1}\right) + \\ + \beta_{k,d} k_{it} + \beta_{l,d} l_{it} + \epsilon_{it} + \xi_{it} \quad (5)$$

[2] Appendix A provides detailed descriptions of the endogenous and explanatory variables.

We based the estimation procedure on the idea introduced by Olley and Pakes (1996), but here both labour and capital coefficients $\beta_{l,d}, \beta_{k,d}$ are estimated. We approximate the non-linear function g by a four-degree polynomial and use the generalized method of moments (GMM) approach. Indeed, for every period t and firm i the residuals $r_{it} = \epsilon_{it} + \xi_{it}$ are orthogonal to all entries of vector $z = [k_{it}, l_{it-1,} m_{it-1}]$. Consequently, we obtained the following estimate of the company's productivity coefficient:

$$\widehat{\omega}_{it} = y_{it} - \hat{\beta}_{k,d} k_{it} - \hat{\beta}_{l,d} l_{it} \tag{6}$$

The company's unadjusted TFP is then calculated as

$$\widehat{TFP}_{it} = e^{\widehat{\omega}_{it}} \tag{7}$$

The $\widehat{TFP}_{it}$ values can be directly used to analyze the determinants affecting a company's performance or, once aggregated, indicate productivity by economic sector or region.

TFP Aggregation and TFP Growth Decomposition

TFP aggregation of firms from a given group G_t (*e.g.* NACE division or sector) in year t is performed by the weighted average

$$\widehat{\omega_{G_t}} = \sum_{i \in G_t} s_{it}\, \widehat{\omega}_{it} \tag{8}$$

with weights s_{it} based on input variables characterizing companies' sizes:

$$s_{it} = \frac{K_{it}^{\widehat{\beta_k}} L_{it}^{\widehat{\beta_l}}}{\sum_{i \in G_t} K_{it}^{\widehat{\beta_k}} L_{it}^{\widehat{\beta_l}}} \tag{9}$$

Then, the average TFP growth rate in the group G_t is determined by the formula

$$\Delta^{\%}(TFP_t) = \widehat{\omega_{G_t}} - \widehat{\omega_{G_{t-1}}} \tag{10}$$

The Olley-Pakes decompositions (Olley & Pakes, 1996, Melitz & Polanec, 2015) of log levels and TFP growth implies that

$$\widehat{\omega_{G_t}} = \overline{\omega_{G_t}} + cov(s_{it}, \widehat{\omega}_{it}) \tag{11}$$

and

$$\Delta^{\%}(TFP_t) = \Delta\overline{\omega_{G_t}} + \Delta cov(s_{it}, \widehat{\omega}_{it}) \tag{12}$$

in which $\overline{\omega_{G_t}}$ is the average TFP level in the group G_t and $cov(s_{it}, \widehat{\omega}_{it}) = \sum_{i \in G_t} (\widehat{\omega}_{it} - \overline{\omega_{G_t}})(s_{it} - \overline{s_{G_t}})$. The first component $\Delta\overline{\omega_{G_t}}$ in (12) measures the within-firm effect of TFP growth and captures an increase in individual firm productivity represented by better technology absorption, increasing managerial skills, or innovation. The second term $\Delta cov(s_{it}, \widehat{\omega}_{it})$ in (12) is called between-firm component, which measures the efficiency of resource allocation. Positive levels of between components imply that more productive firms increase their market shares.

RESULTS AND DISCUSSION

The empirical results are presented as follows. Firstly, the panel sample of microenterprises that covers 11 years from 2010 to 2020 is used to estimate a production function and calculate TFP for microenterprises in Poland. Secondly, the sectoral and regional growth decomposition of TFP is provided within three subsamples: 2011-2015, 2016-2019, and 2020. Thirdly, the influence of the COVID-19 pandemic on the microenterprises' TFP growth in 2020 is singled out. Finally, the within- and between-firm effects of growth for sectors are identified.

Estimation Results

In the first step, we performed the estimations of parameters of production functions (1) separately for homogenous groups of companies from sector G_d defined by NACE Rev. 2 division in Poland (see Table 2. in Appendix C). We employed the LP model with time and regional dummies (see Table 2 in

Appendix C) for each homogenous division G_d. The estimators' standard errors are determined using a bootstrap procedure. Figure 2 summarizes the input elasticities for all divisions.

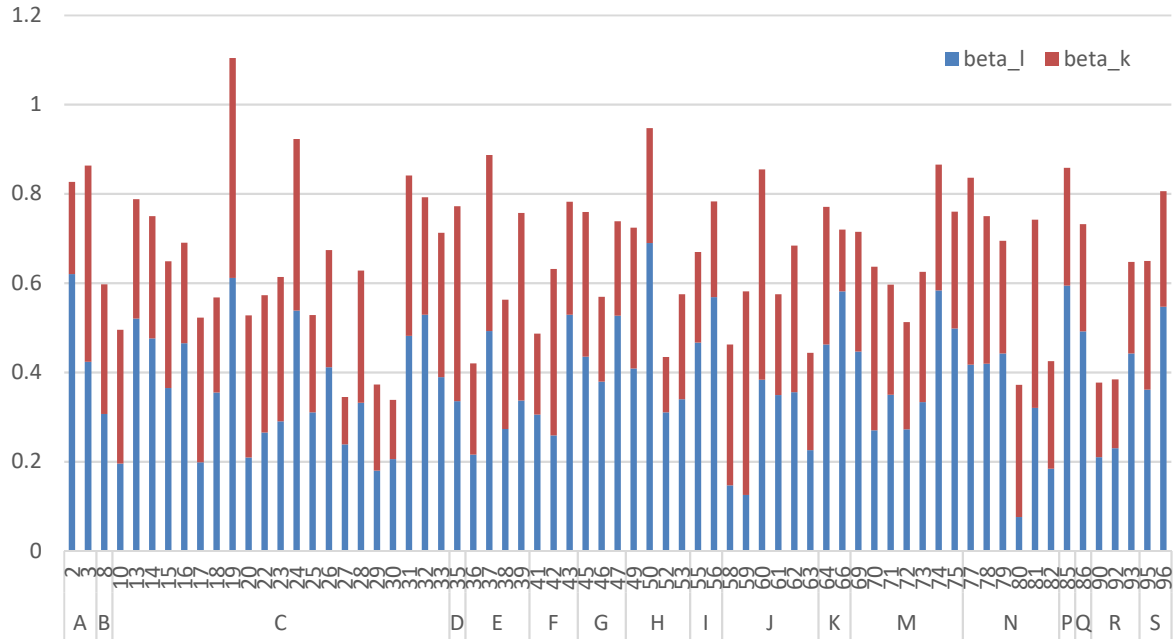


Figure 2. Production function estimation: inputs elasticities by divisions

Note: Elasticities $\beta_{k,d}$ (beta_k) and $\beta_{l,d}$ (beta_l) of the sectoral production functions (see equation (1)) by NACE divisions.
Source: own elaboration based on the LP model.

In most of the analysed regressions, Student's t-tests indicate that labour and capital have a statistically significant (see Table 3 in Appendix D) positive impact on the companies' gross value-added (all p-values < 0.01). The time and regional dummies used in explaining the transition equation (4) turn out to be significant for most cases (see the last two columns in Table 3 in Appendix D). Increasing returns to scale are only for petroleum production $(d = 19)$. For all other divisions, returns to scale are decreasing. In the case of the manufacture of coke and refined petroleum products $(d = 19)$, manufacture of other transport equipment $(d = 30)$, water transport $(d = 50)$, residential care activities $(d = 87)$, and gambling and betting activities $(d = 92)$ the influence of capital and labour on gross value added turn out to be insignificant, while for divisions: mining support service activities $(d = 9)$, manufacture of primary pharmaceutical products and pharmaceutical preparations $(d = 21)$, real estate activities $(d = 68)$, social work activities without accommodation $(d = 88)$, libraries, archives, museums and other cultural activities $(d = 91)$, the values of estimated elasticities were negative. Due to unacceptable estimates and an insufficient number of observations, we excluded microenterprises from the divisions listed above from the estimation sample.

In the second stage of the analysis, based on the production functions estimates, we calculated the company's unadjusted TFP (see equations (6)-(7)), which is further aggregated by the weighted average and decomposed by Olley-Pakes method (as described in equations (8)-(12)). Figure 3 presents the empirical distribution of TFP for microenterprises in 2010, 2015, and 2020. The distribution was relatively symmetrical and moved towards the right in 2020. Figure 9 in Appendix B presents detailed empirical distributions for the whole sample.

Sectoral Decomposition of TFP Growth

We conducted the sectoral analysis of unadjusted TFP growth within three periods: 2011-2015, 2016-2019, and 2020 separately. The last one describes the impact of the pandemic outbreak on the productivity of microenterprises from particular sectors in Poland. The COVID-19 pandemic caused an increase in sector-specific TFP growth volatility. Therefore, we observed substantial positive impacts of COVID-19 in a number of industries as well as significant adverse effects in others.

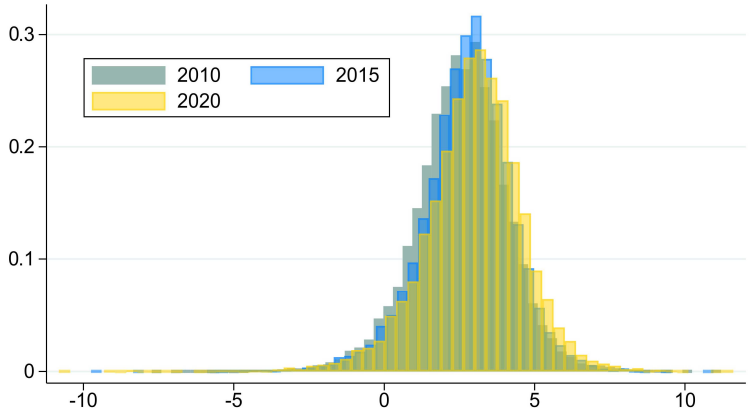


Figure 3. Empirical distribution of micro-firm TFP in cross-sectors defined by years

Note: Empirical distribution of TFP indices $\widehat{\omega}_{it} = \log \widehat{TFP}_{it}$ given by equation (6).

Source: own elaboration based on the LP model.

Figure 4 presents the changes in average annual TFP growth for 15 sectors[3] of the Polish economy that are listed in Table 1 in Appendix C.

During the first analysed period, between 2011 and 2015, TFP growth leaders are (symbols and TFP growth are in brackets): arts, entertainment, and recreation (R, almost 7%), water supply; sewerage and waste management activities (E, 6%), accommodation and food service activities (I, 6%), information and communication (J, 4%), and manufacturing (C, 4%). Poor productivity performance is observed in the following sectors: administrative and support service activities (N, -3%), construction (F, -1,1%) and professional, scientific, and technical activities (M, -1%), which produce together about 47% of sector gross value added in 2015. However, these sectors' poor performance may result from the highest weighted TFP levels in 2010. On the other hand, microenterprises from the wholesale and retail trade sector (G), which accounted for almost 20% of gross value added, obtained moderate average annual growth of 2.3%. In conclusion, the average annual TFP growth of microenterprises in all sectors reached 1.4% in 2010-2015. It was presumably a result of the 2008-2009 global financial crisis, the subsequent worldwide economic recession, market volatility, and lacklustre economic growth.

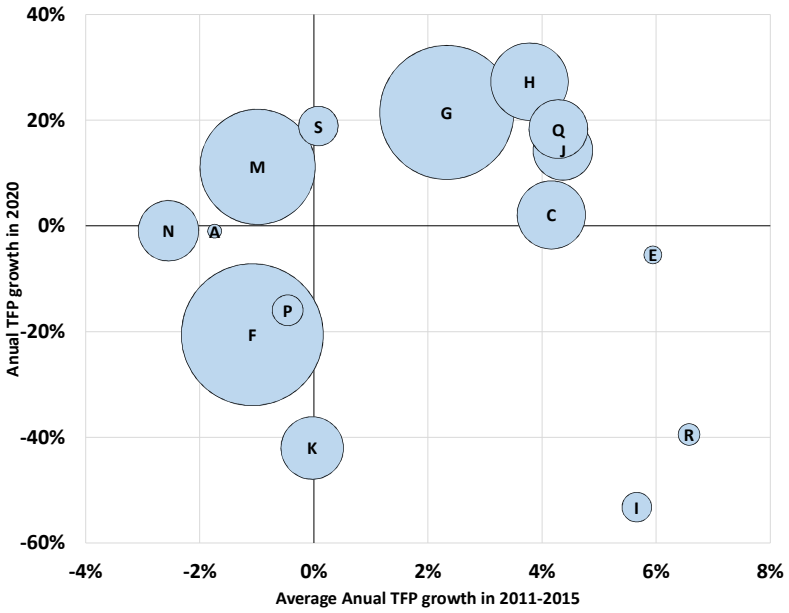
In the second analysed period (2016-2019), we observed a substantial increase in average annual TFP growth (5.4% in relation to 1.4% in the previous period). Between 2016 and 2019, the excellent productivity performance can be assigned to microenterprises from two sectors: construction (F) and financial and insurance activities (K), which represented in 2019 30% and almost 4% of gross value added respectively and accounted for 13% and 15% of average annual TFP growth. The second main sector among microenterprises wholesale and retail trade (G), which generated almost 20% of gross value added in 2019, also positively contributed to overall TFP between 2016 and 2019 with 4% of average annual TFP growth. Generally, microenterprises from almost all sectors except transportation and storage (H, -0,8%) and human health and social work activities (Q, -1%) contributed positively to overall average annual TFP growth. Thus between 2016 and 2019, the average annual TFP growth in microenterprises was generally higher than in the previous period. The reasons behind that may be related to the stability of the economic situation in industry, low inflation rate, and accommodative monetary policy.

The average annual TFP growth in 2020 shows the consequences of the pandemic outbreak concerning microenterprises productivity. The following sectors: transportation and storage (H), wholesale and retail trade (G) with shares in GVA 7% and 22% in 2020 displayed outstanding average annual productivity growth of 27% and 22%, respectively. However, good performance can be also assigned to information and communication (J, 14% of average annual TFP growth) and professional, scientific, and technical activities (M, 11%), which were responsible for 5% and 15% of total gross value added in 2020. Therefore, the increased interest in online shopping and courier delivery led to the development of microenterprises

[3] Sectors B, D, L, and O are represented by the small number of microenterprises, and their GVA shares in total GVA are below 3%, thus, we omitted them in Figure 4.

associated with trade, transportation, and storage. The pandemic outbreak also positively impacted the productivity growth of microenterprises from sectors related to information, communication, professional, scientific, and technical activities and education, which is probably the consequence of the increase in demand for information technology services, telecommunication, services offering professional and specialist knowledge and online trainings during lockdown caused by COVID-19.

(a) Average annual TFP growth: 2011-2015 vs. 2016-2019



(b) Average annual TFP growth: 2011-2015 vs. 2020

Figure 4. Sectoral decomposition of TFP growths

Note: The size of the dots represents GVA shares of the sectors in the entire micro-firm gross value added in 2019 (panel (a)) and 2020 (panel (b)).

Source: own elaboration.

On the other hand, in 2020, the pandemic outbreak caused a drop in average annual TFP growth by 20% in construction (F), which is responsible for a considerable share in gross value added (24%) in 2020. Due to the global lockdown, COVID-19 has also negative influence on the TFP growth of microenterprises from sectors: accommodation and food service activities (I, -53%), financial and

insurance activities (K, -42%), arts, entertainment,[4] and recreation (R, -39%). However, microenterprises from these sectors produce only less than 6% of GVA.

Let us summarise the productivity of micro-firms from the crucial sectors (in terms of GVA shares) over the analysed period. In the case of microenterprises from the construction sector, the average annual TFP growth fluctuated considerably over time. From -1.1 % between 2011 and 2015, then between 2016 and 2019 it recovered with an average of 13%, while in the last year of the sample, the COVID-19 pandemic led to a huge drop in its productivity by 20%. Between 2011 and 2020, the average annual TFP growth of companies from the wholesale and retail trade sector followed an upward trend from 2% between 2011 and 2015, then 4% in the second period to 21.5% after the COVID-19 appeared. We can explain this by the growing interest in online shopping and consumption resulting from panic. The TFP growth in the transportation and storage sector fluctuated from 4% in the first period, then it dropped to a negative value -0.8% between 2016-2019 and became a leader during the COVID-19 pandemic (27%) as the consequence of demand on online shopping and delivery services. The productivity of microenterprises from the professional, scientific, and technical activities sector developed significantly from -1% of TFP growth between 2011 and 2015 to almost 11% between 2019 and 2020.

The changes in sector GVA to overall GVA ratios between the years 2019 and 2020 are also worth considering. In sectors, which experienced negative effects of the COVID-19 pandemic (F, I, K, R) declines in GVA ratios are observed. In construction by 6% percentage points (from 30% to 24%), in accommodation and food service activities from 1.5% to 1.1%, and in arts, entertainment and recreation from 1.4% to 0.6%. Whereas in the case of leader sectors with high productivity growth, a slight increase in GVA ratios between 2019 and 2020 can be noticed, from 19% to almost 22% in wholesale and retail trade and from almost 4% to 7% in transportation and storage. The manufacturing sector calls also for particular attention because TFP in the sector has stagnated since 2012. This outcome can relate to the following issue, labour productivity growth that significantly outpaces TFP growth indicates that the expansion of the manufacturing industry comes primarily from increasing capital intensity rather than improvement in technical efficiency.

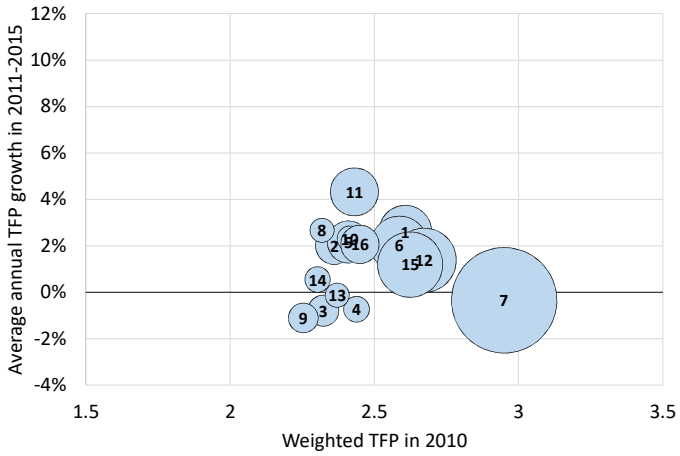
Summing up, the pandemic induced heterogeneous effects related to TFP growth. On the one hand, microenterprises from sectors: wholesale and retail trade (G), transportation and storage (H) and professional, scientific and technical activities (M), which produced in 2020 almost 50% of gross value added, were influenced positively by the lockdown caused by COVID-19. On the other hand, microenterprises representing more consumer-facing economic activities displayed negative TFP growth after the pandemic outbreak.

Regional Decomposition of TFP Growth

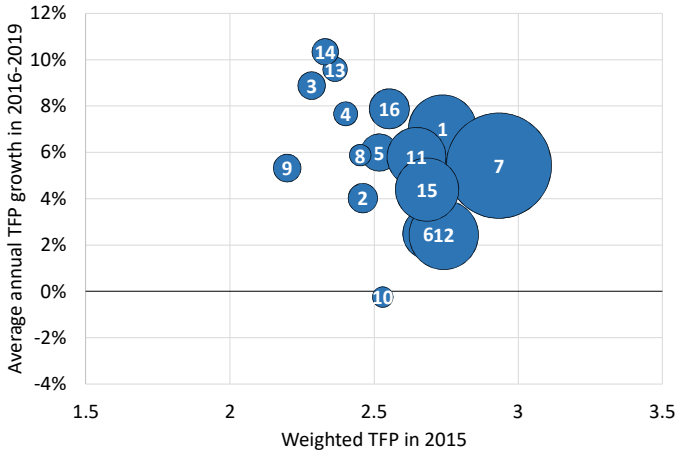
Figure 5 and Figure 6 presents the regional analysis of micro-firm average annual TFP growth. We performed this study for 16 regions and separately for three periods: 2011-2015, 2016-2019, and 2020. Table 2 in Appendix C contains an explanation of the Polish regions. The size of the dots in Figure 5 and Figure 6 represents GVA shares of microenterprises from particular Polish regions in the gross value added of all microenterprises.

Between 2011 and 2015, we observed poor productivity performance (with negative TFP growth) in microenterprises from the following regions (symbols in brackets): lubelskie (3), lubuskie (4), mazowieckie (7), podkarpackie (9), świętokrzyskie (13), while the leaders in average annual TFP growth were microenterprises from pomorskie with 4% of growth on average. During that period in most regions rather moderate TFP growth was observed from 1.2% (in wielkopolskie) to 2.7% (in opolskie). Let us analyse briefly the microenterprises from mazowieckie region (7), which produced in 2015 29% of gross value added. Although their TFP growth was negative (-0.3%) in the analysed period, they obtained the highest weighted average of TFP in 2010. We conclude that in most cases (instead of 5 exceptions) regions with a relatively low level of weighed TFP converge to highly productive regions by proving high levels of average annual TFP growth.

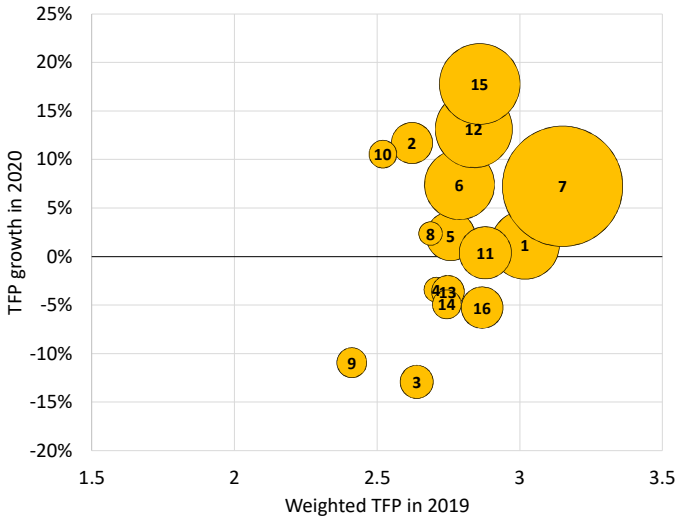
[4] The impact of COVID-19 pandemic on artist's identity and entrepreneurship is discussed in Szostak and Sułkowski (2021).



(a) Average annual TFP growth in 2011-2015 vs. weighted TFP levels in 2010 by NACE sections



(b) Average annual TFP growth in 2016-2019 vs. weighted TFP levels in 2015 by NACE sections

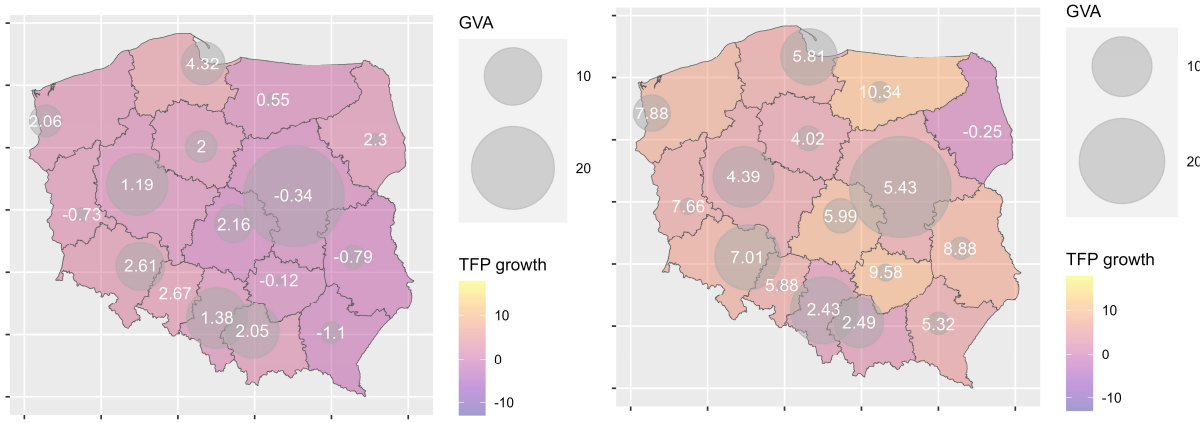


(c) Annual TFP growth in 2020 vs. weighted TFP levels in 2019 by NACE sections

Figure 5. Regional decomposition of micro-firm TFP growths
Note: The size of the dots represents GVA shares of the sectors
in the entire micro-firm gross value added in 2015 (panel (a)), 2019 (panel (b)) and 2020 (panel (c)).
Source: own elaboration.

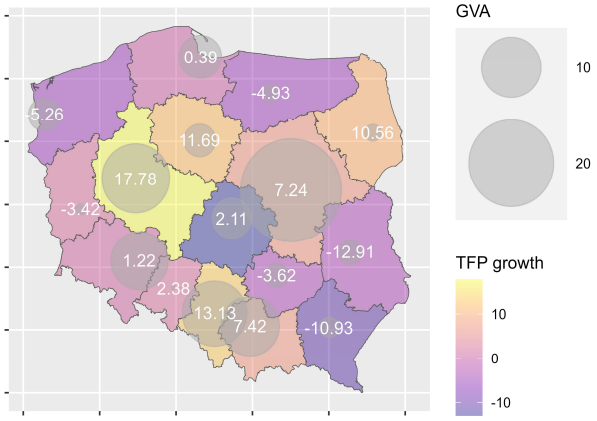
Between 2015 and 2019, the average productivity of microenterprises in Poland increased and they displayed considerably better performance than in the previous period. Among all regions, only microenterprises from podlaskie (10) displayed on average negative TFP growth between 2015 and

2019. Microenterprises from all other regions experienced positive average TFP growth from 2% in malopolskie to 10% in warmińsko-mazurskie. In regions with highly productive microenterprises (mazowieckie – 7, śląskie – 12, dolnośląskie – 1, wielkopolskie – 15, pomorskie – 11, małopolskie – 6), which in total account for 74% of GVA, rather moderate average annual TFP growth is observed with maximum 7% in dolnośląskie. We observed the convergence from less productive to more productive regions for all regions except podlaskie (10).



(a) Average annual TFP growth in 2011-2015 and GVA shares in 2015 by the Polish regions

(b) Average annual TFP growth in 2016-2019 and GVA shares in 2019 by the Polish regions



(c) Annual TFP growth and GVA shares in 2020 by the Polish regions

Figure 6. Regional micro-firm TFP growths

Note: the numbers denote the average annual TFP growth rates, and the size of dots indicates the share of GVA (in p.p.) in a particular region in total GVA at the end of the period.

Source: own elaboration.

The results obtained for the last period present the impact of the pandemic outbreak on microenterprises' productivity. In most regions, the microenterprises proved to be productive between 2019-2020 (see Figure 6). Various factors influence the increase in average annual TFP growth in 2020, for example, the effectiveness of anti-crisis shields, the severity of COVID-19 in individual regions, and the individual ability to adapt to the lockdown by introducing remote work opportunities. The industry structure in individual regions also plays an important role, *i.e.* adapting to lockdown was easier for companies with developed IT infrastructure. At the same time, it was difficult for enterprises from tourist regions. The negative average annual TFP growth is observed in microenterprises from: lubelskie (3), lubuskie (4), warmińsko-mazurskie (14), zachodniopomorskie (16), świętokrzyskie (13), and podkarpackie (9), which jointly produced only 12% of gross value added in 2020. Although the leaders with average yearly TFP growth over 10% are only three regions: wielkopolskie 15 (18%), śląskie 12 (13%), kujawsko-pomorskie (12%), they contributed almost one-third of total gross value added. Podlaskie (10) region is kind of an outlier observation with good produc-

tivity performance (10% of growth) but one of the lowest weighed TFP levels (2.52). Microenterprises from mazowieckie (with the highest GVA share equal to 28%) positively contributed to overall average annual TFP growth (7%). To conclude, the COVID-19 pandemic outbreak had a positive effect, especially on microenterprises from regions with considerable GVA shares and rather high TFP levels. Therefore, we did not observe convergence in that period.

The Olley-Pakes Decompositions of TFP Growth

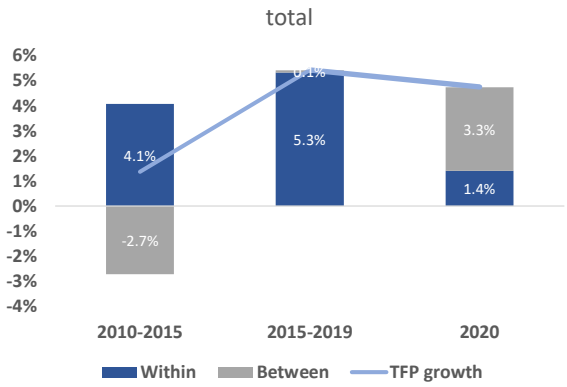
We subjected the Polish micro-firms TFP growth between 2011 and 2020 to additional analysis in order to decompose it into the within- and between-firm effects of growth (see Figure 7 and Figure 8). In this part of the study, we considered only those sectors, which was significantly influenced by the COVID-19 pandemic outbreak. Recall that the within-firm component of the TFP growth measures the gains from firms' own productivity performance. It represents a shift in the distribution of firm productivity. The between component of the TFP growth represents the productivity growth coming from the reallocation of resources across companies.

Figure 7 presents the TFP growth of those NACE sectors that exhibited positive values in 2020. In the first two analysed periods, aggregated TFP growth for all microenterprises was driven by the within-firm component, while in 2020, the between-firm component prevailed.

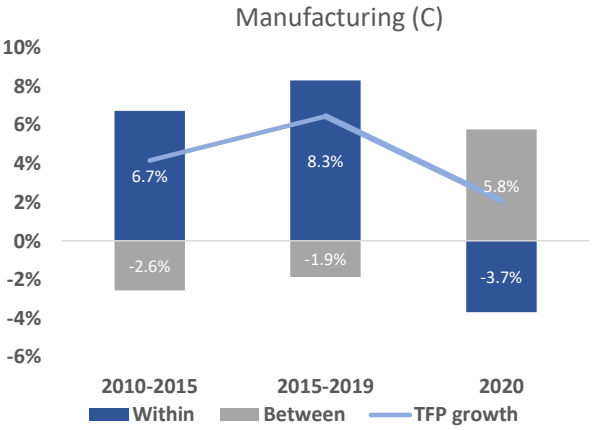
Before the pandemic outbreak, within-firm effects stimulated average TFP growth in microenterprises from the manufacturing (C) sector, but the efficiency of resource allocation was negative. In 2020, positive TFP growth was maintained by the between-firm effects, while the within-firm component caused a decline in TFP growth of microfirms from the manufacturing sector. The studies of Albinowski *et al.*, 2015 and World Bank, 2021 for small, medium and large enterprises in the manufacturing sector during 2006-2019, show that the reallocation of production factors across manufacturers within industries was negative for most years, especially in 2014 and 2019. The increase of within-firm components mainly explained TFP growth. However, during the global financial crisis, we observed the reallocation of resources into more productive firms. We confirmed the same effects for micro-firms in the manufacturing sector during the COVID-19 pandemic.

In the case of microenterprises from wholesale and retail trade (G) in 2020, the efficiency of resource allocation was also the main component of their TFP growth, while in the case of microenterprises from transportation and storage (H) the impact of within and between components was balanced. We observed the opposite situation for microenterprises from information and communication (J), for which TFP growth was mainly driven by the within-firm component.

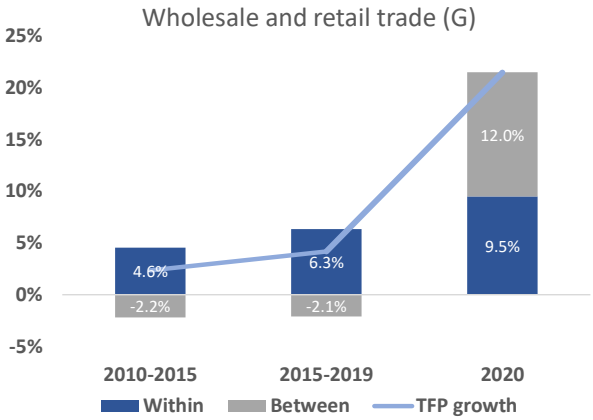
Figure 8 highlights the sectors with high negative TFP growth in 2020. In the case of microenterprises from sectors: I, R, and K, the within-firm component prevailed, while in the case of microenterprises from construction – between-firm effects, which means that in construction, the productivity degrowth of microenterprises was driven by a reallocation of resources from less to more productive firms.



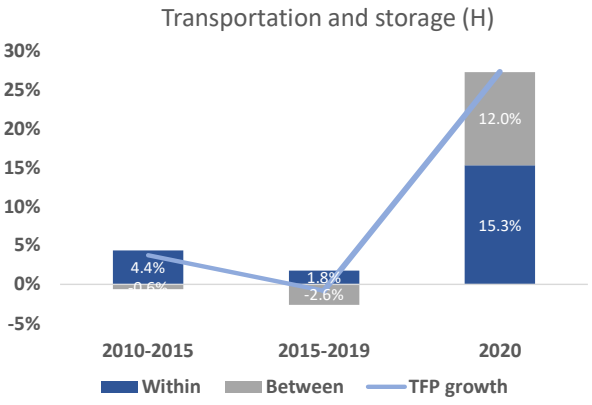
(a) Annual TFP growth for the whole sample of microenterprises in Poland by periods



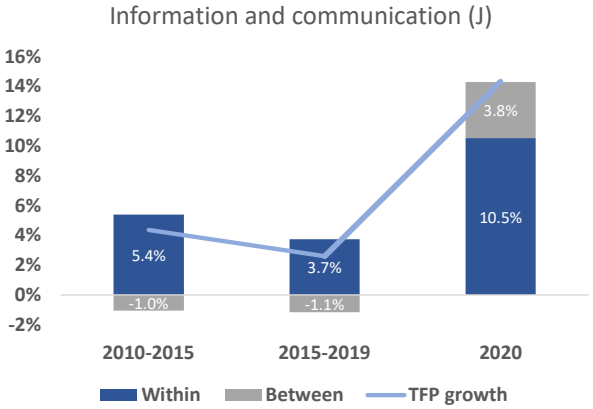
(b) Annual TFP growth in section C by periods



(c) Annual TFP growth in section G by periods



(d) Annual TFP growth in section H by periods



(e) Annual TFP growth in section J by periods

Figure 7. The Olley-Pakes decomposition of micro-firm TFP growth, part A
Note: the numbers denote the average annual TFP growth rates.
Source: own elaboration.

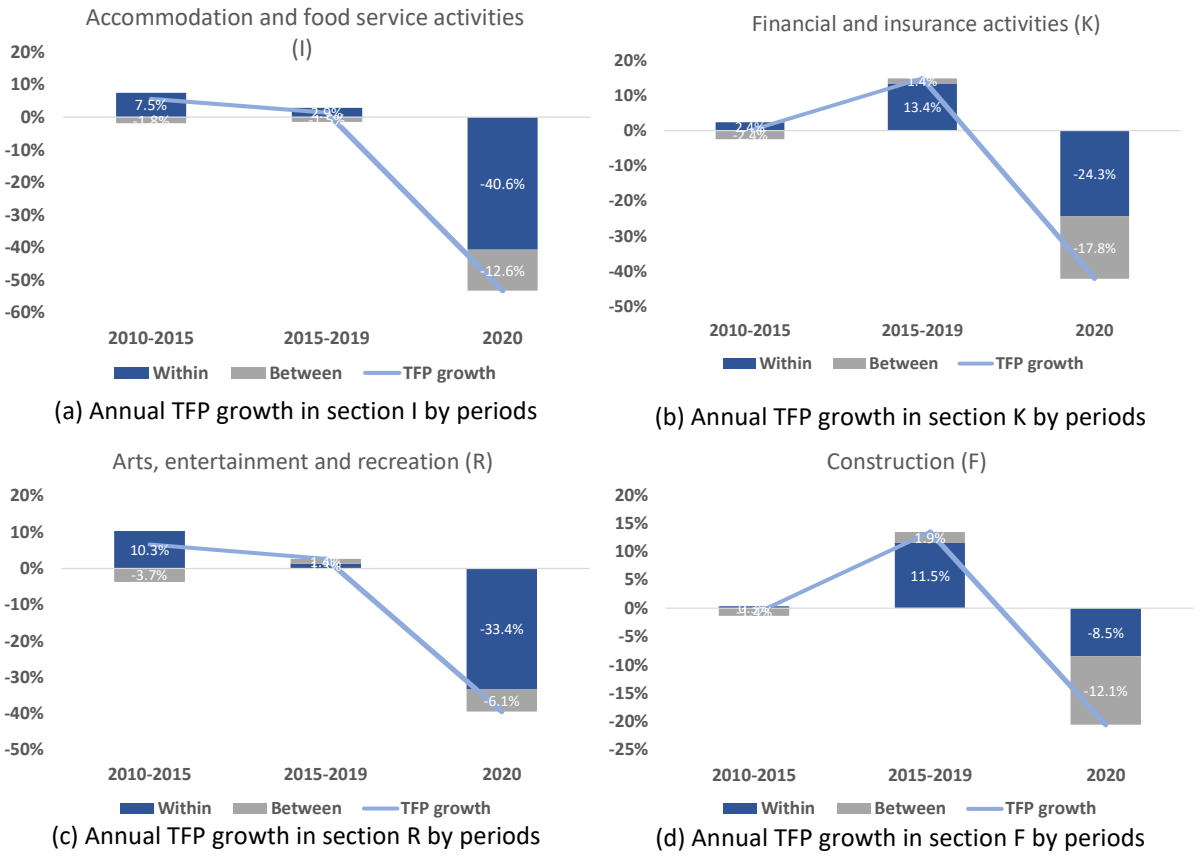


Figure 8. The Olley-Pakes decomposition of micro-firm TFP growth, part B
Note: the numbers denote the average annual TFP growth rates.
Source: own elaboration.

CONCLUSIONS

Our study aims to fill the research gap in the analysis of TFP for microenterprises in Poland. We can conclude that over the sample 2010-2020, the average TFP growth of micro firms in Poland was generally positive even during the pandemic outbreak. However, in 2020, we observed substantial heterogeneity between sectoral and regional TFP growths.

Empirical results confirmed the research hypotheses. Analysis of the sectoral and regional decomposition of TFP growth revealed considerable diversity in productivity growth rates between sectors and regions. The shock caused by the COVID-19 pandemic was transferred to the analysed sectors and regions in various ways, depending on their idiosyncratic characteristics, which determined their ability to adapt to the new situation. Productivity of microenterprises from the following sectors: construction, wholesale, and retail trade, professional, scientific and technical activities, which jointly produced about 60% of gross value added, was influenced considerably by the lockdown. The best performance can be assigned to transportation and storage, wholesale and retail trade, information and communication, professional, scientific and technical activities. The increased interest in online shopping, courier delivery and various online services might be the reason for the productivity growth of microenterprises associated with those services. On the other hand, the pandemic caused a fall in construction productivity with considerable GVA share and huge drops in sectors associated with accommodation and food service activities, financial and insurance activities, arts, entertainment and recreation, representing low production shares. The regional analysis concluded that the COVID-19 pandemic positively affected microenterprises from regions with considerable GVA shares and relatively high weighted TFP levels. Thus, we did not observe convergence in that period.

Based on the Olley-Pakes decomposition of TFP growth, we confirmed that before the outbreak of the COVID-19 pandemic, the aggregated TFP growth of microenterprises in Poland was driven by the within-firm component. In contrast, in 2020, the efficiency of resource allocation was the main component of micro-firm TFP growth. We may formulate the same conclusion for manufacturing, wholesale, and retail trade. However, in the case of transportation and storage and information and communication, the productivity degrowth after the pandemic outbreak was driven by the within-firm component.

The recent financial and sovereign debt crises prompted calls for courageous structural policies in several eurozone countries while declining growth in many developed and developing countries highlighted the need for regulatory reforms to boost productivity and growth. This analysis might help to identify regions and sectors of the Polish economy that suffer from substantial inefficiencies and thus require policy attention. The structural policy should consider the heterogeneity of productivity across sectors and regions and adjust instruments to the productivity level of particular sectors and regions. For instance, structural policy can be directed to increase investments in prosperous sectors or regions and propose support (*e.g.* enhancing digitalisation, training, and technology changes) that ensures an increase in less productive sectors or regions.

The research presents the outlook of the consequences of the COVID-19 pandemic on microenterprises in Poland. The next stage of the study assumes the finding of the determinants of TFP growth based on the micro-data panel model.

REFERENCES

Ackerberg, D.A., Caves, K., & Frazer, G. (2015). Identification Properties of Recent Production Function Estimators. *Econometrica*, *83*(6), 2411-2451. https://doi.org/10.3982/ECTA13408

Ahmed, T., & Bhatti, A.A. (2020). Measurement and Determinants of Multi-Factor Productivity: a Survey of Literature. *Journal of Economic Surveys*, *34*(2), 293-319. https://doi.org/10.1111/joes.12360

Albinowski, M., Hagemejer, J., Lovo, S., & Varela, G. (2015). Sustaining Micro Competitiveness to Ensure Convergence and Macro Resilience of the Polish Economy. *MF Working Paper Series, Ministry of Finance in Poland*, *21*, 1-101. Retrieved from https://mf-arch2.mf.gov.pl/documents/764034/5005995/mf_wp_21.pdf on July 2, 2023.

Basu, S., & Fernald, J.G. (2002). Aggregate productivity and aggregate technology. *European Economic Review*, *46*(6), 963-991. https://doi.org/10.1016/S0014-2921(02)00161-7

Baumann, J., & Kritikos, A.S. (2016). The link between R&D, innovation and productivity: Are micro firms different?. *Research Policy*, *45*(6), 1263-1274. https://doi.org/10.1016/j.respol.2016.03.008

Bloom, N., Bunn, P., Mizen, P., Smietanka, P., & Thwaites, G. (2020). The Impact of Covid-19 on Productivity. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3753742

Chen, S., & Lee, D.Q. (2020). Small and Vulnerable: Small Firm Productivity in the Great Productivity Slowdown. *SSRN Electronic Journal*, *Available*. https://doi.org/10.2139/ssrn.3772499

Dankiewicz, R., Balawejder, B., Tomczyk, T., & Trynchuk, V. (2021). The impact of the COVID-19 pandemic on the due payments of Polish entreprises from selected industries. *Investment Management and Financial Innovations*, *18*(2), 144-154. https://doi.org/10.21511/imfi.18(2).2021.12

Dańska-Borsiak, B., & Laskowska, I. (2012). The Determinants of Total Factor Productivity in Polish Subregions. Panel Data Analysis. *Comparative Economic Research*, *15*(4), 17-29. https://doi.org/10.2478/v10103-012-0023-9

Górajski, M., & Błażej, M. (2020). A control function approach to measuring the total factor productivity of enterprises in Poland. *Bank i Kredyt*, *53*(3), 293-316. Retrieved from https://bankikredyt.nbp.pl/content/2020/03/BIK_03_2020_04.pdf on July 2, 2023.

Gosińska, E., & Ulrichs, M. (2020). Sectoral Production Functions: Results from Panel Models for Poland. *Gospodarka Narodowa*, *302*(2), 71-94. https://doi.org/10.33119/gn/116617

Gradzewicz, M., & Muck, J. (2023). Globalization and the fall of markups. *The World Economy* https://doi.org/10.1111/twec.13480

Grela, M., Majchrowska, A., Michałek, T., Mućk, J., Stążka-Gawrysiak, A., Tchorek, G., & Wagner, M. (2017). Is Central and Eastern Europe converging towards the EU-15?. *NBP Working Paper*, (264). Retrieved from https://nbp.pl/wp-content/uploads/2022/10/264_en.pdf on July 2, 2023.

Hagemejer, J. (2006). Czynniki wpływające na decyzję przedsiębiorstw o eksporcie. Analiza danych mikroekonomicznych. *Bank i Kredyt*, *7*, 30-43. Retrieved from https://bankandcredit.nbp.pl/home.aspx?f=/content/2006/2006_07/hagemejer.html on July 2, 2023.

Hagemejer, J., & Kolasa, M. (2011). Internationalisation and economic performance of enterprises: Evidence from polish firm-level data. *World Economy*, *34*(1), 74-100. https://doi.org/10.1111/j.1467-9701.2010.01294.x

Hall, B.H., Lotti, F., & Mairesse, J. (2009). Innovation and productivity in SMEs: Empirical evidence for Italy. *Small Business Economics*, *33*(1), 13-33. https://doi.org/10.1007/s11187-009-9184-8

IMF. (2019). *Republic of Poland: Selected Issues*. *IMF Country Reports* (Vol. 19). Washington. https://doi.org/10.5089/9781484397503.002

Kaszowska-Mojsa, J. (2020). Innovation strategies of manufacturing companies during expansions and slowdowns. *Entrepreneurial Business and Economics Review*, *8*(4), 47-66. https://doi.org/10.15678/EBER.2020.080403

Kirzner, I.M. (1973). *Competition and Entrepreneurship*. Chicago: The University of Chicago.

Kluzek, M. (2022). State Aid for SMEs During the Pandemic in Poland. *Annales Universitatis Mariae Curie-Skłodowska, Sectio H – Oeconomia*, *55*(4), 23-35. https://doi.org/10.17951/h.2021.55.4.23-35

Kochaniak, K., Ulman, P., & Zajkowski, R. (2023). Effectiveness of COVID-19 state aid for microenterprises in Poland. *International Review of Economics and Finance*, *86*(January), 483-497. https://doi.org/10.1016/j.iref.2023.03.038

Kotlewski, D. (2021). *KLEMS productivity accounting for the Polish economy*. Warsaw: Statistics Poland. Retrieved from https://srp.stat.gov.pl/SRP/gus_srp_vol3_kotlewski_KLEMS_productivity_accounting_for_the_Polish_economy.pdf on July 2, 2023.

Krugman, P.R. (1997). *The age of diminished expectations: US economic policy in the 1990s* (3rd ed.). Cambridge, Mass.: MIT press.

Lafuente, E., Acs, Z.J., Sanders, M., & Szerb, L. (2020). The global technology frontier: productivity growth and the relevance of Kirznerian and Schumpeterian entrepreneurship. *Small Business Economics*, *55*(1), 153-178. https://doi.org/10.1007/s11187-019-00140-1

Levinsohn, J., & Petrin, A. (2003). Estimating production functions using inputs to control for unobservables. *Review of Economic Studies*, *70*(2), 317-341. https://doi.org/10.1111/1467-937X.00246

Mahadevan, R. (2003). To measure or not to measure total factor productivity growth?. *Oxford Development Studies*, *31*(3), 365-378. https://doi.org/10.1080/1360081032000111742

Marjański, A., & Sułkowski, Ł. (2021). Consolidation strategies of small family firms in poland during the covid-19 crisis. *Entrepreneurial Business and Economics Review*, *9*(2), 167-182. https://doi.org/10.15678/EBER.2021.090211

Melitz, M.J., & Polanec, S. (2015). Dynamic Olley-Pakes productivity decomposition with entry and exit. *RAND Journal of Economics*, *46*(2), 362-375. https://doi.org/10.1111/1756-2171.12088

Michalski, K. (2022). Study of the Impact of the Pandemic on the Functioning of Micro-Enterprises in the Silesian Voivodeship. *Scientific Papers of Silesian University of Technology. Organization and Management Series*, *2022*(161), 121-135. https://doi.org/10.29119/1641-3466.2022.161.9

Olley, G.S., & Pakes, A. (1996). The Dynamics of Productivity in the Telecommunications Equipment Industry. *Econometrica*, *64*(6), 1263. https://doi.org/10.2307/2171831

Osińska, M., & Zalewski, W. (2023). Vulnerability and resilience of the road transport industry in Poland to the COVID-19 pandemic crisis. *Transportation*, *50*(1), 331-354. https://doi.org/10.1007/s11116-021-10246-9

Pyrkosz-Pacyna, J., Nawojczyk, M., & Synowiec-Jaje, L. (2021). Entrepreneurial resilience in the covid-19 crisis: A qualitative study of micro and small entrepreneurs in poland. *Polish Sociological Review*, *216*(4), 571-591. https://doi.org/10.26412/psr216.08

Schumpeter, J., & Backhaus, U. (1934). The theory of economic development. In *Joseph Alois Schumpeter: Entrepreneurship, Style and Vision* (pp. 61-116). Springer.

Statistics Poland (2021), Activity of non-financial enterprises in 2020, Warszawa 2021.

Sulimierska, M. (2014). Working Paper Series. *University of Sussex Working Paper Series*, *67*. https://doi.org/10.20955/r.85.67

Świeczewska, I. (2013). Modele sektorów przemysłu według stopnia zaawansowania techniki. *Acta Universitatis Lodziensis. Folia Oeconomica*, *294*. Retrieved from http://hdl.handle.net/11089/10551 on July 2, 2023.

Szostak, M., & Sułkowski, Ł. (2021). Identity crisis of artists during the covid-19 pandemic and shift towards entrepreneurship.

Entrepreneurial Business and Economics Review, *9*(3), 87-102. https://doi.org/10.15678/EBER.2021.090306

van Beveren, I. (2012). Total factor productivity estimation: A practical review. *Journal of Economic Surveys*, *26*(1), 98-128. https://doi.org/10.1111/j.1467-6419.2010.00631.x

Welfe, A., & Karp, P. (2017). Makroekonometryczny miesięczny model gospodarki Polski WM-1. *Gospodarka Narodowa*, *4*, 5-38. https://doi.org/10.33119/GN/100726

Wong, Z., Chen, A., Taghizadeh-Hesary, F., Li, R., & Kong, Q. (2023). Financing Constraints and Firm's Productivity Under the COVID-19 Epidemic Shock: Evidence of A-Shared Chinese Companies. *European Journal of Development Research*, *35*(1), 167-195. https://doi.org/10.1057/s41287-021-00501-1

World Bank. (2017). *Lessons from Poland, Insights for Poland: A Sustainable and Inclusive Transition to High Income Status. Lessons from Poland, Insights for Poland: A Sustainable and Inclusive Transition to High Income Status.* Washington, DC. Retrieved from http://hdl.handle.net/10986/28960 on July 2, 2023.

World Bank. (2021). *Paths of Productivity Growth in Poland*. *Paths of Productivity Growth in Poland*. Washington. https://doi.org/10.1596/37047

Zając, A., Wielechowski, M., & Czech, K. (2022). Use of de minimis credit guarantees by SMES from the wholesale and retail trade. *Journal of Modern Science*, *2*(49), 275-296. https://doi.org/10.13166/jms/156235

Appendix A: Definition of firm-level variables

Based on the annual enterprise survey data and attached external variables (*e.g.* investment, capital, and gross value-added deflators), we calculated the values of the endogenous and explanatory variables according to the following formulas:

Firstly, the company's global output is defined as

$$output = rev - tax \tag{13}$$

in which:

rev - total operating revenues;

tax - excise tax.

The intermediate consumption ($intermConsump$) is measured by the total operating costs. The company's gross value-added (gva) is the difference between its global output ($output$) and intermediate consumption ($intermConsump$)

$$gva = output - intermConsump \tag{14}$$

The company's capital stock ($capital$) is defined as the tangible fixed assets at the end of a year. The perpetual inventory capital construction method is unreliable in this instance due to the relatively short sample period. The variables' final measurement is determined by calculating the enterprise's real gross value-added and real capital stock at constant average prices from 2015. For this purpose, we used capital- and gross-value-added deflators in the two-digit sectors.

Appendix B:

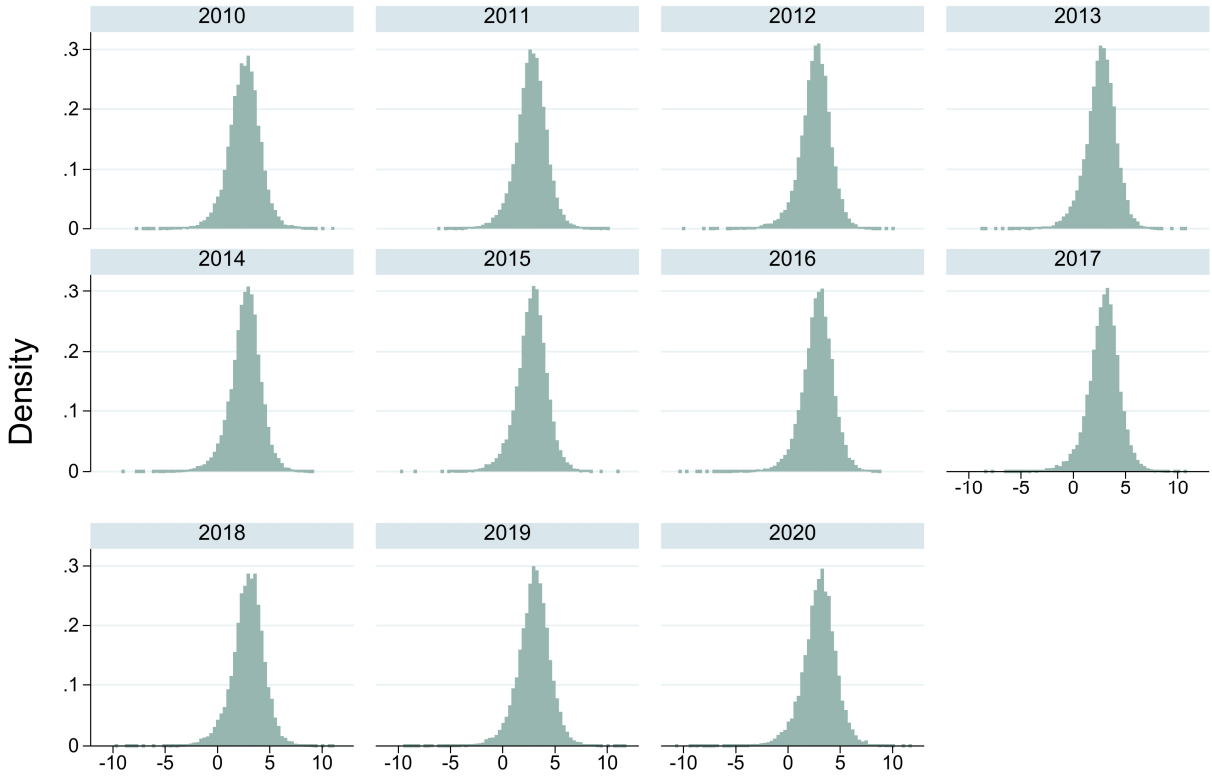


Figure 9. ***Empirical distribution of $\hat{\omega}_{it} = log\,\widehat{TFP}_{it}$ in cross-sectors defined by years***
Source: own elaboration based on the LP model.

Appendix C:

Błąd! Nie można odnaleźć źródła odwołania. presents the sectors of industries in Poland according to NACE Rev.2 of the statistical classification of economic activities in the European Community.

Table 1. The symbols of analysed sectors in Poland

Symbol	Industry sector
A	Agriculture, forestry and fishing
B	Mining and quarrying
C	Manufacturing
D	Electricity, gas, steam and air conditioning supply
E	Water supply; sewerage, waste management and remediation activities
F	Construction
G	Wholesale and retail trade; repair of motor vehicles and motorcycles
H	Transportation and storage
I	Accommodation and food service activities
J	Information and communication
K	Financial and insurance activities,
L	Real estate activities
M	Professional, scientific and technical activities
N	Administrative and support service activities
O	Public administration and defence; compulsory social security
P	Education
Q	Human health and social work activities
R	Arts, entertainment and recreation
S	Other service activities

Source: NACE Rev.2 statistical classification of economic activities in the European Community (Eurostat, 2008).

Table 2. The symbols of regions in Poland

Symbol	Region
01	dolnośląskie
02	kujawsko-pomorskie
03	lubelskie
04	lubuskie
05	łódzkie
06	małopolskie
07	mazowieckie
08	opolskie
09	podkarpackie
10	podlaskie
11	pomorskie
12	śląskie
13	świętokrzyskie
14	warmińsko-mazurskie
15	wielkopolskie
16	zachodniopomorskie

Source: Source: NUTS 2 statistical classification in Poland (Statistics Poland).

Appendix D:

Table 3. The production function of estimation results

Section	Division	$\widehat{\beta}_{k,d}$	p. value for $H0: \beta_{k,d} = 0$	$\widehat{\beta}_{l,d}$	p. value for $H0: \beta_{l,d} = 0$	Returns to scale	Wald test for constant return to scale, p-value	Insignificant time dummies for 2010-2019	Insignificant regional dummies
A	2	0.620	0.000	0.207	0.000	0.827	0.000		4
	3	0.424	0.000	0.440	0.000	0.863	0.000	2017	1, 8
B	8	0.307	0.000	0.290	0.000	0.597	0.000		2, 5, 9, 10
C	10	0.195	0.000	0.300	0.000	0.495	0.000	2018, 2019	16
	13	0.520	0.000	0.267	0.000	0.788	0.000	2014, 2018, 2019	
	14	0.476	0.000	0.274	0.000	0.750	0.000		6
	15	0.364	0.000	0.285	0.000	0.649	0.000		12
	16	0.465	0.000	0.225	0.000	0.690	0.000		2, 3, 12
	17	0.199	0.000	0.324	0.000	0.522	0.000	2016	
	18	0.354	0.000	0.213	0.000	0.568	0.000		
	19	0.611	0.201	0.493	0.038	1.104	0.000	2010, 2017, 2018	5, 14
	20	0.209	0.000	0.319	0.000	0.528	0.000		
	22	0.265	0.000	0.307	0.000	0.572	0.000		11
	23	0.290	0.000	0.324	0.000	0.614	0.000		8, 13
	24	0.538	0.000	0.384	0.000	0.922	0.000	2013, 2015, 2016	12
	25	0.310	0.000	0.219	0.000	0.528	0.000	2011, 2016	
	26	0.411	0.000	0.263	0.000	0.674	0.000		14, 15
	27	0.239	0.000	0.106	0.001	0.345	0.000	2014	1
	28	0.332	0.000	0.296	0.000	0.628	0.000		12
	29	0.179	0.001	0.193	0.000	0.372	0.000		8, 9
	30	0.206	0.000	0.132	0.016	0.338	0.000	2015	13
	31	0.482	0.000	0.359	0.000	0.841	0.000		16
	32	0.529	0.000	0.263	0.000	0.792	0.000	2016	
	33	0.389	0.000	0.324	0.000	0.713	0.000		11, 12, 15, 16
D	35	0.335	0.000	0.437	0.000	0.772	0.000	2018	
E	36	0.216	0.015	0.204	0.166	0.420	0.000	2011, 2019	
	37	0.492	0.000	0.394	0.000	0.887	0.000		8
	38	0.273	0.000	0.290	0.000	0.563	0.000		1, 12, 16
	39	0.337	0.000	0.420	0.000	0.757	0.000		8

Section	Division	$\widehat{\beta}_{k,d}$	p. value for $H0: \beta_{k,d} = 0$	$\widehat{\beta}_{l,d}$	p. value for $H0: \beta_{l,d} = 0$	Returns to scale	Wald test for constant return to scale, p-value	Insignificant time dummies for 2010-2019	Insignificant regional dummies
F	41	0.305	0.000	0.182	0.000	0.487	0.000		
	42	0.259	0.000	0.373	0.000	0.631	0.000		10
	43	0.529	0.000	0.253	0.000	0.782	0.000		
G	45	0.435	0.000	0.324	0.000	0.759	0.000		13
	46	0.379	0.000	0.191	0.000	0.569	0.000		12
	47	0.527	0.000	0.212	0.000	0.739	0.000		
H	49	0.408	0.000	0.315	0.000	0.724	0.000		1, 5, 8, 10, 14
	50	0.690	0.000	0.258	0.142	0.947	0.000	2013, 2016	2, 5, 1, 11, 12
	52	0.310	0.000	0.124	0.000	0.434	0.000	2018	12, 15
	53	0.339	0.000	0.236	0.000	0.575	0.000		
I	55	0.466	0.000	0.203	0.000	0.669	0.000	2018	
	56	0.568	0.000	0.214	0.000	0.782	0.000		
J	58	0.147	0.000	0.315	0.000	0.462	0.000		
	59	0.125	0.000	0.456	0.000	0.582	0.000	2011, 2015	
	60	0.383	0.000	0.472	0.000	0.855	0.000	2012, 2014	
	61	0.349	0.000	0.226	0.000	0.575	0.000	2018, 2019	5
	62	0.355	0.000	0.328	0.000	0.684	0.000		
	63	0.225	0.000	0.219	0.000	0.444	0.000		
K	64	0.462	0.000	0.309	0.000	0.771	0.000		
	66	0.581	0.000	0.139	0.000	0.720	0.000		
M	69	0.446	0.000	0.269	0.000	0.715	0.000		
	70	0.270	0.000	0.366	0.000	0.636	0.000		
	71	0.350	0.000	0.247	0.000	0.596	0.000		12
	72	0.272	0.000	0.240	0.000	0.512	0.000	2018, 2019	5, 6, 13
	73	0.333	0.000	0.292	0.000	0.625	0.000		
	74	0.584	0.000	0.282	0.000	0.865	0.000		5
	75	0.498	0.000	0.262	0.000	0.760	0.000		2
N	77	0.417	0.000	0.419	0.000	0.836	0.000		12
	78	0.419	0.000	0.331	0.000	0.750	0.000	2014	14
	79	0.442	0.000	0.253	0.000	0.695	0.000		5, 6
	80	0.075	0.022	0.296	0.000	0.372	0.000		5
	81	0.320	0.000	0.421	0.000	0.742	0.000		
	82	0.184	0.000	0.241	0.000	0.425	0.000		4
P	85	0.594	0.000	0.264	0.000	0.858	0.000		
Q	86	0.492	0.000	0.240	0.000	0.732	0.000	2011	2, 4
R	90	0.210	0.000	0.167	0.000	0.377	0.000	2010	
	92	0.230	0.295	0.155	0.494	0.384	0.000	2012, 2013, 2016, 2019	5, 8, 10, 12, 15, 16
	93	0.442	0.000	0.205	0.000	0.647	0.000		8, 11
S	95	0.361	0.000	0.288	0.000	0.649	0.000	2013, 2016	4
	96	0.547	0.000	0.258	0.000	0.805	0.000		15

Source: own elaboration based on the LP model.

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The contribution of particular authors in the writing of the article is as follows (in %):
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Acknowledgements and Financial Disclosure

We are grateful to anonymous referees for their insightful comments and suggestions. The authors would like to express their gratitude to Mirosław Błażej and Dariusz Kotlewski from Statistics Poland, and members of the Institute of Econometrics (University of Lodz), the World Bank team, the Reginal Statistical Office in Lodz, and participants of the 48th Macromodels International Conference for their valuable comments of the draft version of this paper and his inspiration to further research study.

Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest. The views and opinions presented in this article are those of the authors and have not been endorsed by Statistics Poland.

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Published by Krakow University of Economics – Krakow, Poland

Ministry of Education and Science
Republic of Poland

The journal is co-financed in the years 2022-2024 by the Ministry of Education and Science of the Republic of Poland in the framework of the ministerial programme “Development of Scientific Journals” (RCN) on the basis of contract no. RCN/SP/0583/2021/1 concluded on 13 October 2022 and being in force until 13 October 2024.

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INTERNATIONAL
TRADE
DEPARTMENT

ISSN 2353-883X

eISSN 2353-8821